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ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.

London-Paris Without a Change

NO one expressed surprise when Mr. R. Holland-Martin, Chairman of the Southern Railway, stated at the inaugural ceremonies on October 12 that the sleeping cars for the new train ferry service between London and Paris had already been booked up for a fortnight in advance. The general opinion of those who travelled back from Paris by the new route on the inaugural specials last Monday night was that the service would prove highly popular. The sleeping cars are comfortable and well equipped, they run very smoothly, and even when passing on to and off the ferry boat there was little noise. The easy arrangements for customs and passport formalities ensure the undisturbed comfort of travellers, and the only criticism that could be offered on the inaugural trip was that, during the Channel crossing, the cars became rather hot, due apparently to inadequate ventilation of the train deck,

but this should be easily rectifiable. The new sleeping cars are the first vehicles of the kind for regular use in this country to be equipped with roller bearings. It will be interesting to observe whether the noticeable smoothness of their running when new will be maintained after a period of service, for the ordinary type of bogie with plain bearings is apt to develop a hunting motion if permitted to exceed its normal period between overhauls. Better running with less maintenance is a claim made for the roller bearing axlebox, with which side play is minimised, and the steadiness of riding was noticeable in the new cars when traversing sharp curves.

* * * *

Expansion or Restriction?

Sir Alfred Read's presidential address to the Institute of Transport last Monday, reported on page 631, concerned itself largely with the fact that, at the present time, transport facilities are ahead of requirements. Sir Alfred suggested ingenious, if complicated, regulations, the adoption of which was calculated to benefit coastwise shipping at the expense of other forms of transport. Thus, once again, we catch a glimpse of the bitter struggle between those whose livelihood depends upon a share of the inadequate purchasing power of the community. The people want to travel; they would like to travel in comfort, and when the spirit moves them rather than in the discomfort of compulsory rush hours; but the demand remains latent because of a lack of money tickets. On the other hand, every transport agency wants the people to travel, and is capable of providing just the facilities the people would like to enjoy. We look forward to the day when producer and consumer will get together and seriously investigate why it is they cannot now mutually benefit as they should. Restriction has had a long enough innings. The turn of expansion is overdue.

* * * *

The Week's Traffics

Earnings of the four main line companies for the past week show a total increase of £127,000, as against one of £180,000 for the previous week. Passenger train receipts again supply the greater part (£79,000) of the advance, merchandise is £50,000 net up, and coal shows a net decrease of £2,000. The L.M.S.R. merchandise increase to date is £1,092,000, or 5·96 per cent., against 5·88 per cent. for the two previous weeks. There has been a steady, though slow, advance in Southern merchandise earnings for some time past, giving an increase for the year to date of £43,000, or 1·71 per cent. For the 41 weeks of the current year the four companies together show an advance of £4,006,000, or 3·35 per cent.

	41st Week			Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.
L.M.S.R. ..	+ 30,000	+ 44,000	+ 5,000	+ 79,000	+ 1,986,000 + 4·13
L.N.E.R. ..	+ 16,000	- 5,000	- 3,000	+ 8,000	+ 1,189,000 + 3·40
G.W.R. ..	+ 16,000	+ 8,000	- 2,000	+ 22,000	+ 527,000 + 2·62
S.R. ..	+ 17,000	+ 3,000	- 2,000	+ 18,000	+ 304,000 + 1·85

Mersey Railway receipts to date show an improvement of £1,825. The Belfast & County Down is now £3,294 up on the year, with increases of £1,832 from passengers and of £1,462 from goods.

* * * *

Six Months' Passenger Train Traffics

The advance in the number of journeys at standard fares on all standard-gauge British railways (except London Transport and the Whitechapel & Bow) which was so noticeable in the first quarter of 1936 was not maintained during the second quarter of the year. As is

shown by the six-months' analysis published with the Ministry of Transport statistics for June, the 3·16 per cent. increase for the first three months has come down at the end of the half year to 71,915, or 0·17 per cent. only. Standard fare receipts have, however, not come down in the same proportion, as for the six months they show an increase of 1·50 per cent., against 3·37 per cent. at the end of March. The amount received was £3,059,880, equal to 14·67 per cent. of all ordinary passenger receipts. First class ordinary numbers and receipts continue to improve, but the rate of advance has not been so high for the second quarter as for the first. Ordinary first class journeys for the six months were 6,985,826, an increase of 634,701, or 9·99 per cent., and represented 1·70 per cent. of the total ordinary passenger journeys. In the first class ordinary receipts of £1,751,973 for the same period there was an increase of £158,978, or 9·98 per cent., and these receipts were 8·40 per cent. of the total from ordinary passengers. Season ticket receipts for the six months were £4,189,350, an increase of £71,935, or 1·75 per cent., but in the earnings of £6,238,040 from parcels and miscellaneous traffic there was a decrease of £50,622, or 0·80 per cent. Total receipts from passenger train traffic (excluding mails and parcels post) amounted to £31,282,544, an increase of £772,245, or 2·53 per cent.

* * * *

Buenos Aires Transport Act

The Bill for the co-ordination of all forms of passenger transport in the City of Buenos Aires, which as announced in the news columns of our issue of October 2, was passed by the Senate on September 30, became law when promulgated by the Executive Power a few days later. The special committee whose terms of reference are to recommend to the Government the form in which the Law will be put into practice, has six months—a term which may be extended to one year—in which to draft its report, so that actual co-ordination will not be in operation for some time to come. When it is, it is to be hoped that this new Act will give the Anglo-Argentine Tramway Company a new lease of life, as it certainly deserves well of the City of Buenos Aires. For years it has supplied a service second to no city in the world, at ridiculously cheap fares—in spite of obstruction by politicians out to curry favour with the masses—and its vehicles carry their patrons from one end of the City to the other, a distance of many miles, for the uniform fare of 10 cents (1½d.). For a little more than 3d., one can travel by tram from Retiro station to Quilmes (a suburb served by the Buenos Ayres Great Southern Railway) 14 miles away; this being the result of rate-cutting by the buses.

* * * *

Canadian Railway Wages

Canadian railwaymen, who are asking for the cessation of the existing 10 per cent. cut in basic wage rates, have filed an application for a board of conciliation under the terms of the Industrial Disputes Investigation Act. It will be remembered that the first deduction in consequence of the fall in revenues caused by the depression was a 10 per cent. reduction made in 1931 in the salaries and wages of all officers and employees, applicable to the majority of the payrolls. This reduction was extended early in 1932 to the remainder of the payrolls, following negotiations with the employees affected, and on October 1, 1932, an additional 15 per cent. reduction in directors' fees, and an additional 10 per cent. reduction in salaries of officers and of supervisory grades were applied. After protracted negotiations and proceedings before boards of conciliation under the Industrial Disputes

Investigation Act, a deduction of 15 per cent. from basic rates of pay to all classes of employees became effective. The 15 per cent. deduction was in operation throughout 1934, but in accordance with an arrangement made in November, 1934, the deduction was reduced on January 1, 1935, to 12 per cent., and on May 1, 1935, to 10 per cent. It was part of the arrangement that after July 1, 1935, a thirty days' notice of a desire to alter the percentage might be served by the company or the employees. Formal notice to abolish the existing 10 per cent. deduction was served by the employees on March 31 last.

* * * *

The First Railway in Russia

Great Britain was intimately associated with the introduction of the railway to Russia, as indeed into most European countries, and, as the centenary of opening the first line falls at this time, the occasion should not pass unnoticed. The prime mover in the scheme was the famous Austrian, or Czech, engineer, and railway pioneer, Herr Franz von Gerstner, who visited Russia in 1834 to inspect some mines. The Tsar Nicolas had already seen one of Murray's engines at work in England, and therefore willingly gave Gerstner a concession of March 21, 1836, forming the Petersburg & Pavlovsk Railway Company. The Austrian selected 6 ft. as the gauge, and began the work in April, but British participation soon followed, for the *Petersburg Gazette* announced in June that all the rails had been contracted for in England. By September, Robert Stephenson & Co. had shipped a locomotive for the line, which, on trial, was stated to have run at 65½ m.p.h. Timothy Hackworth also built an engine for this railway, which was credited with 72 m.p.h. Eventually all the rails (65 lb. per yd.), locomotives, turntables, carriages, and wagons were secured in this country and imported into Russia duty free. An agent—Christopher Kreeft—was appointed, with offices in London. Part of the line, from Pavlovsk to Tsarskoe Selo, was opened to traffic (with horse traction) on October 9, 1836; locomotives were publicly introduced in the presence of the Imperial family on November 22; and the railway was completed throughout to Petersburg and formally inaugurated on October 30, 1837.

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Activity at Aberdeen

With so versatile a city at its centre, the Aberdeen district of the L.M.S.R. has ample sources of traffic to draw upon all the year round. Not only is Aberdeen pre-eminent as a fishing port, a livestock centre, and a hive of industry and engineering, but in itself and in the area which it commands, it offers many attractions to tourist traffic. There is then, no "off season" for Aberdeen, as Mr. H. Ross, the District Goods and Passenger Manager, points out in the October issue of the L.M.S.R. Commercial Department journal, *Quota News*. But the traffic is not to be won without initiative on the part of the railway representatives. The main road between Aberdeen and the South touches the district throughout, while the fact that Aberdeen is a port of call for many and regular tramp steamer services is a further incentive to the railway in bringing home to traders the merits of its own facilities. For perishable traffic, of course, the railway is unrivalled, and three special express fish trains are run to London daily. Aberdeen also despatches a meat train at 9.45 every morning, giving delivery in London for the following morning's market. Every year sees an increasing output of fruit from the Aberdeen district, requiring three special trains daily during the season.

Another Large Power Signalling Installation

Last week-end the L.N.E.R. brought into use the large new power signalling installation at the west end of Waverley station, Edinburgh, covering an area extending as far as Haymarket, and enabling five mechanical signal boxes, containing 415 levers, to be dispensed with. The mechanical signalling at this station, the east end of which remains, though it too is likely soon to be similarly converted, was rightly considered to be quite remarkable when it was put in. The East box, for instance, was provided with no fewer than 260 levers in one continuous frame, one of the largest in the country, and the West box had 205 levers. The days of such large concentrations of wire and rod working are, however, fast drawing to an end. There is now at Waverley a 227-lever electric frame, with the usual illuminated diagram repeating the conditions of the completely track-circuited layout, and up-to-date train describers. The cabin contains over 500 relays. Colour-light signals have, of course, been adopted, with route-indicators for incoming movements to the platforms. The points are worked by electric machines. During the last few years the L.N.E.R. has been steadily adopting electrical signalling of the latest kind wherever it might lead to economies, and facilitate and accelerate traffic, and it was evident that, sooner or later, the somewhat intricate layout of Waverley station would fall within the scope of this progressive movement. The greater centralisation of control should decidedly make for smoother working.

* * * *

Signalling in the Irish Free State

How the signal engineer has helped the railways in the Irish Free State to effect a large reduction in operating costs was described by Mr. H. J. Guthrie in his paper before the Institution of Railway Signal Engineers last Wednesday. The paper, abstracted in the present issue, affords a good general view of the present practice of the Great Southern Railways, on which, since their formation in 1924, much standardisation work has been carried out by the Signal Department, and some original methods of meeting certain operating difficulties were first applied in the Free State, involving no little ingenuity of design. The electric train staff is greatly in evidence, with the many interesting subsidiary appliances developed in recent years for applying it to outlying junctions and sidings, and the closing of intermediate block posts at certain hours. The singling of the old Midland Great Western main line, which aroused misgivings in some minds when it was undertaken, has proved entirely satisfactory, and must have enabled important savings to be realised. If the signalling of the Free State lines does not include any large power and automatic signalling installations, for which there is as yet little call, it is nevertheless of considerable interest to both the signal engineer and operating officer. That the apparatus functions well and is handled by an efficient staff, is proved by the excellent accident record of the last quarter of a century.

* * * *

Level Crossing Elimination in America

Not only is considerable energy and ingenuity being displayed in the United States in the improvement of level crossing warning devices, but a programme of the Federal Government for the elimination of 2,506 such crossings is being fast proceeded with. So far, 296 elimination or improvement schemes have been completed at a cost of \$11,407,438, and 1,279 projects, costing \$110,161,184 are under way. The total cost of the programme will be approximately \$150 million, but this, like the other figures quoted, includes the improvement of conditions by the rebuilding of existing structures at crossings where the

separation of road and rail has already been achieved. Many of the schemes are being carried out in rural areas, where the average cost of each is reckoned as \$41,600. In urban districts, however, typical of which is the execution of 62 projects in New York, the average cost will be approximately \$158,775. For the whole country, the Bureau of Public Roads estimates an average of \$85,000 to \$90,000. The bureau is also seeking to achieve standardisation in the form of warning signals displayed at level crossings.

* * * *

Reducing Coach Weights

A feature of recent main-line rolling stock construction is that, after years of slowly but steadily increasing tare weights per vehicle, the curve of weight is at length turning in a downward direction. On the London & North Eastern Railway, for example, the latest 8-compartment corridor thirds weigh $31\frac{1}{4}$ tons apiece, whereas a year or so ago $34\frac{1}{2}$ tons was a common figure. Similarly, the latest low-waisted G.W.R. main line stock has come down in weight from 33 to 31 tons per coach. Even such small changes as these are by no means negligible. On the Northern main lines the effect, in large measure, of armrests in third-class compartments, additionally to increased traffic, has been enormously to expand train formations, so that trains of fifteen, sixteen, and even seventeen bogie vehicles are now common. A reduction in tare by, say, 3 tons a vehicle in a 17-coach train means an aggregate reduction of over 50 tons; or, to put it in another way, a 17-coach train of the lighter stock imposes only a few tons more weight on the locomotive's powers of haulage than a 15-coach train of the lighter. This is all development in the right direction, but lightening of weight will not solve the companion problem of length, for on the L.N.E.R. in particular the 17-coach train is not only outside the platform capacity of such stations as Peterborough, Grantham, and Doncaster, but of King's Cross terminus as well.

* * * *

Steam and the Locomotive

In the early part of this year Mr. Samuel Vauclain, well known to everyone concerned with the building and operating of locomotives, delivered at the Franklin Institute, Philadelphia, a very interesting lecture entitled "What Steam has Meant to Us." After reference to the early pioneers, he paid handsome tribute to James Watt for his work in connection with the use of steam, and said that other great men, among them Oliver Evans, an American builder of mill machinery, had played important parts in "harnessing this giant of power for ever under the control of man." Locomotive builders who for the past 80 years had travelled the same path as did previous inventors, claimed to have followed in the footsteps of Evans, although they had not hesitated to give full credit to such men as Murdoch and others. The development of the locomotive is a familiar story, but the significant fact is that, as demands for improved transportation have arisen from time to time, steam has always met the challenge; locomotive dimensions gradually increased, steam pressures were raised, and efficiency improved. The coming of the superheater, which was developed in Germany, more than any other single feature has made possible the very powerful locomotives we have today. Heavy freight trains are now being hauled at speeds which were considered sufficient in express passenger service not many years ago. In passenger service today the steam locomotive is proving the equal of any other type in speeding up traffic. It is accomplishing this with the highest degree of reliability and safety yet attained in railway work and the end is not yet.

New Zealand Government Railways

A SATISFACTORY increase of £376,388, or 5·68 per cent., in the gross revenues (£7,004,316) of the New Zealand Government Railways was shown for the financial year ended March 31, 1936. The gross earnings include not only receipts from railway operations, but also from subsidiary undertakings such as the Lake Wakatipu steamers, the passenger road motor, refreshment, book-stall, advertising, and departmental dwellings services, and from miscellaneous. In the gross expenditure of £5,952,839, there was an increase of £412,402, or 7·44 per cent. During the year an increase of 7½ per cent. in salaries and wages was granted to the staff, which involved an additional expenditure of £161,555. Net revenue amounted to £1,051,477, a decrease of £36,014, and although interest charges (at 4½ per cent.) were £30,835 lower, the final result was an excess of interest charges over net revenue of £1,248,574, an increase of £5,179. Net revenue represented a return of 1·94 per cent. on capital invested. During the year under review the sum of £204,730 (the same) was charged against revenue for renewals and the sum of £589,288 (against £556,357) on account of depreciation. Subsidiary services and miscellaneous brought in a net revenue of £331,151, compared with £318,015 in 1934-35. From the refreshment service there was a net revenue of £4,156, an increase of £2,024, and from road motor services a net revenue of £8,598, an increase of £2,926. On departmental dwellings the loss was reduced by £22,527. Figures in the accompanying table refer to railway operations only:—

	1935-36	1934-35
Miles open	3,320	3,320
Train-miles	11,050,376	10,626,400
Passengers, ordinary	7,963,824	7,809,035
Goods tonnage	5,618,477	5,444,957
Operating ratio, per cent.	88·46	86·98
	<i>£</i>	<i>£</i>
Passenger receipts	1,466,617	1,368,688
Goods traffic receipts	4,359,750	4,138,434
Operating earnings	6,243,519	5,908,064
Operating expenses	5,523,193	5,138,588
Net earnings	720,326	769,476

Passenger journeys (ordinary and season) increased by 3·58 per cent., passenger revenue by 7·15 per cent., and passenger train-miles by 2·02 per cent. The improvement in revenue was in both classes in the longer distance traffic caused largely by the attractive fares and the higher standard of service both in accommodation and speed. Revenue from parcels, luggage, and mails amounted to £299,964, an increase of £7,868, or 2·69 per cent. In revenue from goods and livestock there was an advance of 5·35 per cent. Goods train mileage increased by 5·53 per cent., and the average haul from 70 miles to 72 miles, with an increase in the average receipt for a ton from 14s. Id. to 14s. 4d. Staff employed at March 31, 1936, including those on works chargeable to capital, numbered 17,908, as compared with 16,189 for the previous year. Branch lines showed an operating loss of £112,755, against £94,307 for the previous year. Of the isolated sections, the Westport section showed an operating profit of £10,330, an increase of £317. The operating loss on the Kaihu section increased from £898 to £2,639, on the Gisborne section from £852 to £4,267, on the Nelson section from £5,533 to £5,874, and on the Picton section from £199 to £785.

The report notes that there is still a tendency amongst consignors to restrict patronage of the railway to the lower-grade commodities when they are able to obtain for the higher-rated products a more favourable rate for the time being by other means of transport. As a result of the review of the goods and mixed train services throughout the North Island a substantial saving of time

in the transport of goods has been effected between stations on the main trunk line and also to and from stations on the connecting lines. Reference is also made to the experimental railcar services in the North Island which are confidently expected to prove attractive to passengers and economical to work by abolishing mixed trains. The main south line is being deviated to obviate the use of the Puketeraki tunnel, and this work is nearing completion. A start has been made with the Wellington-Johnsonville electrification. As from April 1, 1936, the former Railways Board has been abolished, and responsibility for the administration of the railways has been placed with the Government through the Minister of Railways and the General Manager. The policy of the present Government is to complete new lines upon which work was stopped by the previous Government, in order to make the railway system, within a brief period, much more homogeneous than it is at present.

* * * *

The Evolution of the Train Ferry

WITH the inauguration on Wednesday of the passenger train ferry service between Dover and Dunkerque, plans that have engaged attention for three-quarters of a century were brought to fruition. Even the present successful scheme has taken some years of planning and its achievement is the result of the joint efforts of the Southern Railway, the Northern Railway of France, the International Sleeping Car Company, and the Soc. Anon. de Navigation Angleterre-Lorraine-Alsace. Although Great Britain has so far been a comparatively small user of train ferries, this country was nevertheless the pioneer in design and construction, and train ferries turned out by British yards are among the finest in the world. The little 417-ton *Leviathan*, built in 1849 for the Edinburgh, Perth & Dundee Railway Company to run across the Firth of Forth from Granton to Burntisland, inaugurated the type, and was soon followed by another to run across the river Tay at Dundee. The *Leviathan's* maximum capacity was 34 loaded wagons, and both vessels rendered good service before the two rivers were bridged. A train ferry across the River Tees was projected as part of the Durham & Cleveland Union Railway scheme of 1857, but the idea was not followed up at the time, and it was not until 1862 that train ferry proposals came into prominence. In that year Mr. Evan Leigh exhibited models of a train ferry at the International Exhibition at South Kensington, and Sir John Fowler propounded an English Channel train ferry scheme, using steamers very similar to those suggested by Mr. Leigh. In 1865, Wigham Richardson & Co. (as the famous Tyne shipbuilding firm then was) built its first train-ferry steamer. This was for the Prussian Government, and was designed for service on the Rhine pending the construction of a railway bridge. The train-ferry idea attracted considerable attention on the Continent, and in 1872 Wigham Richardson & Co. built the *Lillebelt*, the first Danish Government train-ferry steamer, to carry trains across the Little Belt. She was of only 390 tons displacement, with a maximum speed of 9 knots, but was a wonderful little ship, and performed splendid and regular service for considerably more than half a century before being scrapped well after the war. It was her success that encouraged the Danish Government to develop the idea further, and led ultimately to the magnificent Danish and other Baltic train-ferry services of today. The famous *Sassnitz-Trälleborg* service was opened on July 6, 1909, by arrangement between the German and Swedish Governments.

In the meanwhile, Sir John Fowler continued to advocate his cross-Channel scheme in and out of Parliament, despite

various objections. One of the principal obstacles was that the British Admiralty opposed the scheme on the grounds of national defence, particularly if Dover were chosen as the English terminal. Scott Russell, the famous naval designer, joined Fowler in the scheme and designed a number of ships which differed radically from Mr. Leigh's ideas, and together they secured the passage of a Bill through the House of Commons in 1870, only to have it dropped before it could reach the House of Lords. After the Franco-Prussian war the Bill again passed the Commons and was rejected by the House of Lords by the casting vote of the Chairman of Committees, so Sir John Fowler abandoned the scheme. Scott Russell had suggested using 20-knot paddle steamers 450 ft. long with a beam of 57 ft. inside and 80 ft. outside the sponsons. Railway lines were to be laid on deck and the goods wagons left in the open, but the passenger coaches were to be secured alongside platforms provided with saloons, refreshment rooms, and the like. At this time Lord Armstrong gave evidence as to the practicability of such a proposal. Despite the failure of the English Channel schemes, train ferries were adopted in many parts of the world. The Americans became interested in the question in 1878, and New York Bay was first crossed in this way. San Francisco Bay and the Great Lakes were later provided with train-ferry services, and there are now quite a number of such services in America, with many of the vessels fitted as icebreakers. The Italians began their service across the Straits of Messina in 1899. The construction of the Trans-Siberian Railway brought into being a particularly interesting icebreaker train-ferry, the famous *Baikal*, which was built and erected by Armstrong Whitworth at the Walker yard on the Tyne, dismantled for shipment in sections, and re-erected in the heart of Siberia. This vessel carried the trains across Lake Baikal until the difficult section of railway around the south shore of the lake was finished and so completed through rail communication between Europe and the Asiatic coast. Train ferries have now also become a regular feature of railway operation in many other parts of the world, including India, South America, and China.

During all these developments the scheme for an English Channel ferry was still being urged. Lord Armstrong was joined in his enthusiasm by Sir William White, and between them they evolved a scheme in 1883 for a twin-screw ferry capable of accommodating 18 passenger coaches with the plating of both bow and stern hinged so that the trains could be run on and off conveniently. Sir William White and the firm of Sir W. G. Armstrong Whitworth & Co. again took the matter up in 1901, with the result that a Bill was promoted in 1905 to incorporate and empower the Channel Ferry Company, but Parliament rejected the scheme. Various train ferries were built in the years that immediately preceded the war, of which, perhaps the most interesting was the *Leonard*, built on the Tyne for a Canadian service. She was brought back to this side of the Atlantic during the war and ran across to Cherbourg, thus forming a valuable relief to the famous Richborough ferry, for which the three twin-screw vessels, *Train Ferry Nos. 1, 2 and 3*, were built (two by Armstrong Whitworth) in 1917. These vessels, with a gross tonnage of rather less than 3,000, on a length of 350 ft., and a speed of between 12 and 13 knots, are able to carry 54 loaded wagons. Both on their war service, and since the Armistice on the service between Harwich and Zeebrugge inaugurated by Great Eastern Train Ferries Limited on April 24, 1924, and now owned by the L.N.E.R., they have proved excellent for special cargoes and are responsible for bringing into this country without trans-shipment large quantities of foodstuffs and other perishable commodities from the Continent of Europe.

East Prussia and the Polish Corridor

THE Treaty of Versailles, which established the so-called Polish Corridor and separated both the City of Danzig and East Prussia from Germany proper, led to a complete change in railway working in that part of the world, not only because of the transfer of considerable sections of line from one administration to another, but also because the establishment of frontiers where such had not existed for many years entirely altered the current of trade in the vicinity. Certain sections of line lost their importance and some even became useless, while on others the traffic increased. Before the war there had been Prussian Divisional Managements at Danzig, Posen, and Bromberg (now called Bydgoszcz). The greater part of the lines they controlled passed into the hands of the newly formed Polish State Railways, and it was necessary to re-arrange the lines on the German side of the western frontier of Poland, some being given to existing divisions and others placed under a new divisional management called Osten (East), which is now centred upon Frankfort-on-Oder. The lines in East Prussia itself were then formed into a separate division managed from Königsberg—where a divisional management was first established in 1895—to work lines previously directed from Bromberg. Some 326 km. (203 miles) of lines belonging to the old Danzig Division passed to Königsberg, but 137 km. (85 miles) passed to the Lithuanian State Railways, which took over the working in the Memel territory. One consequence of the creation of the corridor has been the termination at its frontier of a certain number of lines, such as that from Schneidemühl to Königsblick, which originally went on much further to places now in Poland. Over twenty lines have been thus affected.

Effects on trade have been most marked, for in 1913 some 3,500,000 tonnes of merchandise were carried between places now separated by the new frontiers and the consequent Customs barriers. The railway goods traffic between East Prussia and the rest of the country before the war was fully double that dealt with in the port of Königsberg, and the sea traffic at that place was chiefly transit traffic to Russia and other non-German ports. At the most some 600,000 tonnes passed annually by sea from East Prussia to German destinations. Both kinds of traffic have fallen off considerably since the war, and the economic situation has undergone a complete change. The lost portion of Upper Silesia formerly had a large coal market in East Prussia, and the provinces of West Prussia and Posen supplied large quantities of agricultural produce to the rest of Germany. Almost all this traffic has been lost, and the coal has declined at least one-half. Agricultural traffic has now improved, however, though not sufficiently to compensate for the other losses, especially coal, because East Prussia has had to furnish what formerly came from West Prussia Province and Posen. The export figures in 1924 being nearly double those of 1913. But, making allowances for the economic crisis and every other circumstance, the total traffic has declined about one-third compared with the pre-war days. The separated provinces were excellent customers for the rest of the East Prussian district, and the traffic to clients in the main body of the Reich, even if increased as stated, has to go long distances and suffers therefore under heavier charges. Königsberg has lost at the expense of Danzig, Poland naturally seeking to deviate traffic to its own lines by instituting preferential rates, a course which did much harm to the timber traffic entering East Prussia at Prostken. The management of the Reichsbahn, especially of late years, has endeavoured to assist East Prussia in meeting the difficulties due to its isolated position, and has made a point of promoting the efficiency and prosperity

of the railways in that province. Although the proportion of *Nebenbahnen* (secondary railways) is high, fairly good speeds are maintained on several of them compared with such lines in the rest of Germany. At present the train services are not very frequent on any section, the densest traffic being over the short section between Königsberg and Metgethen. Provided political conditions remain undisturbed, there is no reason why trade should not improve in the province, and the railways benefit therefrom. East Prussia is working hard to realise this object. One improvement which is proving of considerable assistance in this direction is the introduction of large numbers of convertible trucks, able to pass to and from the Russian 5-ft. gauge lines and eliminate transhipment with all its loss and annoyance.

Communication between East Prussia and the rest of the Reich is necessarily restricted by the existence of the Polish corridor, but the relations between Germany and Poland, which were greatly strained after the war, have recently improved considerably and this is reflected in the new agreements reached. The first of these was concluded on April 21, 1921, as a result of Articles 89 and 98 of the Treaty of Versailles, which laid down the conditions under which the so-called privileged trains were to pass along certain routes between Germany and East Prussia. Passengers by these trains required no passports and were exempt from Customs examinations, while enjoying the protection of Poland. They might not, however, alight from the train nor open a door, nor a window except when the train was moving, and then only on the corridor side. This rule was found intolerable in hot weather

and has had to be changed. In the ordinary trains passports or identity cards were necessary for through passengers, but not visas, while luggage, save that placed in the vans, was subject to examination. Goods trains were limited as to the number of axles. Although the privileged trains were restricted to certain routes, other trains had five more open to them. The agreement also dealt with military traffic, post and telephone services, inland navigation and motor services, customs, &c. The inconvenience resulting from some of the conditions caused constant complaint and much bad feeling, and Poland admitted that something would have to be done. After prolonged negotiations between Germany, Danzig, and Poland, new agreements were reached on February 14, 1933, and ratified on June 27 of that year. The objectionable condition concerning the windows in the privileged trains was abolished. The number of axles permitted in the various classes of train has been increased, and a certain number of loaded goods wagons admitted to the privileged trains. The RIC and RIV regulations have been adopted. New regulations were made governing the procedure in case of accidents or breakdowns, the use of alternative routes and conditional timings, the treatment of passengers and staff at hospitals in the event of injury, and the protection of their belongings. An increase in the number of German military trains has been permitted, and an office to deal with them has been set up in Danzig. Telegraph and telephone facilities have also been improved, all of which measures have combined to facilitate greatly the communications with East Prussia, and have been cordially welcomed.

LETTERS TO THE EDITOR

(*The Editor is not responsible for the opinions of correspondents*)

The Channel Crossing

London, N.W.11.

October 14, 1936

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR.—The inauguration this week of the Southern Railway train ferry service between Dover and Dunkerque recalls the diversity of the many proposals that have been put forward from time to time for the amelioration of the channel crossing. There have been, of course, some schemes which have depended entirely upon the design of the vessel, and some of these—notably that applied in the case of the *Bessemer*—have been put into practice, but with little success. Perhaps the most popular and evergreen conception has been the Channel tunnel, proposals for which have never failed to capture the imagination of the public. Indeed, at one time matters progressed so far as to result in preliminary excavations being carried out near Dover and on the French side near Sangatte. The first plans for a channel (road) tunnel were discussed more than a hundred years ago, and a later

agitation for a railway tunnel resulted in a number of humorous sketches of satirical proposals appearing in a publication called "The Comic Bradshaw," published in 1848. These included a channel railway balloon line, and a channel railway line carried on boards suspended between rafts!

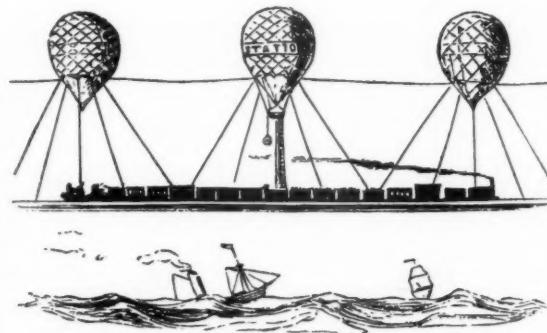
Yours faithfully,

JOHN ANTHONY

[“The Comic Bradshaw or Bubbles from the Boiler” by Angus B. Reach was published by D. Bogue of 86, Fleet Street, London, price sixpence. Readers may remember that two of the sketches to which reference is made were reproduced in THE RAILWAY GAZETTE for January 17 last, but as they now have a topical interest we republish them here. —ED. R.G.]



PROJECTED CHANNEL LINE.



PROJECTED CHANNEL BALLOON LINE.

Sketches from “The Comic Bradshaw or Bubbles from the Boiler” to which reference is made in the above letter

PUBLICATIONS RECEIVED

The West Indies Year Book, including also the Bermudas, the Bahamas, British Guiana and British Honduras, 1936. London : Thomas Skinner of Canada Limited, 330, Gresham House, Old Broad Street, E.C.2. ; Montreal : 437, St. James Street West ; New York : 280, Broadway. 9½ in. x 8 in. 376 pp. Illustrated. Folded map. Price : Great Britain and W. Indies, 7s. 6d. ; Canada, \$2.00 ; U.S.A., \$2.50.—Preceded by an excellent map of the islands and mainland colonies of the West Indies, this year book, which is well got up and illustrated, has several references to railways. Notes on the traffic and financial results on the Jamaica Government Railway for the year ended March 31, 1934, and on the passenger train services and fares are included. Figures for the Trinidad, British Guiana and Stan Creek lines are also given, and the systems are briefly described. The professional and business directories for each colony and general information about it are also most useful.

Ships of the Narrow Seas. By Edmund Vale. London : The London, Midland & Scottish Railway, Euston Station, N.W.1. 8 in. x 5 in. 59 pp. Illustrated in photogravure. Gratis. This booklet is as good as its title, and is, in fact, one of the best of the kind which the L.M.S.R. has yet produced. Ships that sail the Seven Seas are constantly being painted, drawn, and photographed, and commemorated in story and song, but the ships that sail the Narrow Seas receive a bare tithe of what they deserve. There is a tendency to dismiss them as mere "cross-channel boats," or, worse still, as "ferries." Perhaps it is because the ordinary passenger never has time to know the channel steamer as she needs to be known. Many a landsman makes up his mind from the start that he is in for an hour, or several hours of squeamish misery, and takes no further interest in the vessel that carries him across. As Mr. Vale points out, this business of operating cross-channel steamers is just as complicated and specialised as that of running large liners on the wide ocean ways beyond the mountains of Connemara. The cross-channel steamer never settles down to her voyage, and the master, having cleared the port of his departure, is at once faced with preparations for his arrival on the other side. It is not a far cry from Holyhead to King Leary's Town ; it is still less a far cry from Stranraer to Larne. No pilot comes aboard to assist the navigators in getting their three-thousand-ton craft in and out of harbours built for vessels half that size.

Additional interest is given by the historical notes with which the author has laced his six chapters. The illustrations show us such heroines of the past as the quaint square-rigged paddle steamer *Her Majesty*, which first plied between Fleetwood and Belfast in 1843,

and the rakish *Cambria*, built for the Chester and Holyhead Railway in 1848, with her two slender funnels and clipper bow. But why is the old *Cambria* given the prefix "S.S." ? She is certainly not a screw steamer. The four funnelled paddlers of 1860 are also recalled. Full justice is given, of course, to the fine modern vessels of the L.M.S.R. to-day. Mr. Vale's heart is clearly with the historic Royal Mail route, and he is at his best when describing it. The sincerity of his enthusiasm for Holyhead makes up for one or two slight topographical inaccuracies elsewhere. In dealing with the Clyde steamers, for instance, he calls Helensburgh "Helensborough," which is just the sort of thing calculated to make Caledonia stern and wild. Also, did the Romans really build forts against the Saxon invaders ? We always thought that the Saxons prudently waited for the Romans to clear out of Britain before they came in. On the whole, however, this is a very excellent piece of work. The type is good, and some of the illustrations are really beautiful.

The Use of Abrasive Wheels. Fifth edition. London : His Majesty's Stationery Office. 9½ in. x 6 in. 51 pp. Paper cover. Illustrated. Price 9d. net.—A copy of Home Office Safety Pamphlet No. 7, entitled "The Use of Abrasive Wheels," has reached us. This publication, which is now in its fifth edition, contains 51 pages of text and numerous half-tone and line illustrations. The rapid increase in the use of manufactured abrasive wheels has been one of the most marked features in modern industrial progress, and there is a vast and ever-widening field for grinding processes in many industries, including workshops in which locomotives and railway rolling stock are built and repaired. Following the great increase in the number of abrasive wheels, the subject of the dangers incidental to their use has assumed increased importance. The pamphlet has been prepared to direct attention to the causes of these dangers and to suggest various methods of safeguarding persons engaged in grinding processes from accident and damage to health through dust inhalation. It covers the ground very thoroughly and lays down a number of rules and safety precautions to meet all contingencies likely to arise wherever abrasive wheels are used.

Many Happy Returns. By Fougasse & McCullough. Presented free by the National "Safety First" Association on the occasion of the renewal of a driving licence.—The title page explains that this entertaining little booklet—a miniature "You Have Been Warned"—is "intended for road-users of all shapes and sizes who look forward to a happy return." Opposite this dedication is the ominous quotation, "To be or not to be—that is the question." No doubt many recipients who trouble to read

further will recognise ironical little portraits of themselves. For instance, there is the man who with abominable heartiness says, "Not bad—got here under the hour, and my lights aren't working either." Then there is another familiar type who, with a replenished glass before him advises, "Always insist on being tested by your own doctor—if you can speak." Finally and most persistent is the man who always starts off, "But Sergeant . . ." The booklet concludes in deep mourning with some "famous last words"—"Highway Code my foot !" Any motorist, who feels that he cannot wait for his copy of "Many Happy Returns" until his licence falls due for renewal, may obtain one, price 6d., on application to the National "Safety First" Association (Inc.), Terminal House, 52, Grosvenor Gardens, London, S.W.1.

High-Speed Steel Cutters.—Edgar Allen & Co. Ltd. Sharpaform cutters, which introduced a completely new principle in the shape of corrected straight line relief, have now been in use long enough for convincing testimony to their capabilities to have been collected from practical experience. The maker, whose address is Imperial Steel Works, Sheffield, 9, has therefore published a folder setting out the reports of users on the results they have obtained with the cutters, which are unanimous in praising the increased output, fewer regrinds required, and improved finish of products obtainable with these tools. The output per regrind is variously given as from 50 to 60 per cent better than with ordinary cutters. Several clear diagrams, with explanatory text, show the characteristics of the Sharpaform principle. These cutters are made from the well-known range of Stag high-speed steels.

Anti-Corrosion and Heat-Resisting Castings.—The Firth-Vickers stainless steel foundry, Staybrite works, Sheffield, is now in full operation and equipped with the most modern machinery. To signalise this important development in the production of rust-acid-, and heat-resisting steel castings, the firm has published an illustrated and handsomely produced brochure dealing with the applications of such castings, and with the various qualities of steel used in their production. The acid- and rust-resisting castings naturally lend themselves to many purposes associated with the chemical industry, and the handling of foodstuffs, but castings for architectural and decorative purposes also have a wide applicability under modern conditions. Handles, racks, window, and other fittings are produced as castings, and are particularly valuable for public service vehicles in that they retain a smart and pleasing appearance with the minimum of attention. Sets of lettering produced as castings in stainless steel also commend themselves to the attention of all concerned with the practical embellishment of buildings and rolling stock. Among the heat-resisting castings are superheater tube supports and spacers.

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THE SCRAP HEAP

It is odd that the bride who was so careful not to catch her train before the ceremony should be so anxious to catch it afterwards.

* * *

Railway officials explained at an inquiry in London the other day why some goods go astray. In one case "Victoria" was found not to be the London railway terminus, but Victoria Bridge in County Tyrone.—*From the "Irish Times."*

* * *

GLASS RAILS

Friedrich Siemens, of Dresden, has succeeded in casting glass in the same way as metal is cast, and obtaining an article corresponding to cast metal. This cast glass is hard, not dearer in production than cast iron, and has the advantage of transparency, so that all flaws can be detected before it is applied to practical use . . . The hardness and resisting power of this cast glass are so great that experiments are being just now carried out at the Siemens glass foundry at Dresden with the purpose of ascertaining whether the material could be employed for rails on railways.—*From the "Scientific American" of October, 1886.*

* * *

One hidden station on the Underground (electric subway) railroad of London, was used in the war as a secret treasure vault, where, in alcoves, were stored priceless books, and King George's crown jewels, removed from the Wakefield Tower of London for safety from bombing Zeppelin airships. This hidden station is still in use at South Kensington, West London, and seventy feet of electric track link it with the main passenger line.—"Mysteries of the Great War," by Harold T. Wilkins.

* * *

The Original Projector of the Liverpool & Manchester Railway.—In accordance with the spirit of our magazine to notice every subject relating to railways, we offer to our readers' perusal Mr. James's petition to the House of Lords, which, just before the prorogation of Parliament, was presented by Earl Ripon, and another of a similar nature to the Commons, by John Wilks, Esq., M.P. We are not acquainted with the particular grounds of his complaint, nor shall we inquire into his motives for remaining so long in silence and in the shade, but we cannot refrain from observing that if it should prove to be the fact (and we do not dispute it) that he invented the improved railway system, was a partner in the locomotive engine patent, and introduced both to public notice, by originating, surveying, and planning the Liverpool & Manchester

Railway, he must be a person of rather a peculiar character to suffer all the gain and profit as an individual, all the honour and glory as an engineer to be taken from him, whilst every other engineer has been ambitious to obtain even a feather of distinction from having been in the slightest way connected with this very successful undertaking. The causes and motives for this extraordinary forbearance we shall be curious to ascertain, that justice at least may be done to his pretensions by an impartial public.—*From "The Railway Magazine" of October, 1836.*

* * *

Some railway employees in the course of a long journey fell to discussing the evergreen subject:—"Is the locomotive a failure?" So heated was the discussion that none of them noticed the train had been stationary in the open country over half an hour. The locomotive had failed.

A 4-8-6 LOCOMOTIVE!

The first of a remarkable new type of locomotive has been seen (and committed to paper in an advertisement) by a Southern Railway artist. It is a tank engine of the 4-8-6 wheel arrangement and is depicted shunting vehicles on to the train ferry at Dover. We hope (but do not expect) to be able to publish a detailed description of this novel design.

* * *

The claim was advanced in our issue of July 24 last that the longest title held by a British railway company was the Sheffield, Rotherham, Barnsley, Wakefield, Huddersfield, and Goole Railway Company. This undertaking was formed by Act of August 7, 1846, and dissolved by Act of August 2, 1858, on the absorption of its railway by the Lancashire & Yorkshire Railway. No correspondent has yet offered a longer title, and we cannot recall an English rival in length to this name, but Ireland had the Dublin, Rathmines, Rathgar, Roundtown, Rathfarnham, and Rathcoole Railway Company, formed on July 29, 1864. Both these titles contain nine words; does any reader know of a name that totalled a double-figure number of words?

RAILWAY PASSENGER CARRIAGES.

WINTER HOURS.
From 1st OCTOBER to 1st MARCH.

Glasgow to Gartsherrie, Coatbridge, and Airdrie.

Second-Class Steam Train—Half-past Seven, a.m.
First-Class Do. —Twelve, m.
Horse Coach —Two, p.m.
Second-Class Steam Train—Four, p.m.
Airdrie to Glasgow.
Second-class Train—Three-quarters past Eight, a.m.
Horse Coach, —Eleven, a.m.
First-Class Train—One-quarter past One, p.m.
Second-Class Do.—One-quarter past Five, p.m.

* * *

There are no intermediate STOPPING STATIONS; near STEPPES and HOGGANFIELD, the CHRYSTON ROAD, near GARNKIRK, and at GARTCOSH.

The Trip from Glasgow and back occupies about two hours.

An OMNIBUS starts from Wylie & Lochhead's 164, Trongate, Twenty Minutes before the Trains leave the Depot.

Garnkirk & Glasgow Railway Office, }
October, 1836.

From the "Glasgow Herald" of 1836

TRAIN FERRY PLANS OF 1872

Plans are being made at Elswick of some powerful hydraulic machinery which is to be used in Mr. John Fowler's scheme of carrying locomotives and railway carriages across the Channel from Dover to Calais. Sir William Armstrong has calculated that the machinery will hoist train and all from the rail into the ferryboat in the short space of 4 min. 37 sec.—*From "The Engineer" of January 12, 1872.*



One of the striking posters of the new through London-Paris service

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

INDIA

Committee on Signalling

A committee has recently been appointed to consider the general policy to be adopted in regard to signalling on Indian railways, and lay down certain general principles for future installations, which will form the basis on which signal engineers can draw up their schemes. The committee, which met at Bombay on August 25, consists of Mr. J. A. Tower, Chief Operating Superintendent, G.I.P.R. (Chairman), Messrs. L. F. Jackson and G. C. Laughton, Senior Government Inspectors of Railways, Mr. C. H. Griffiths, Signal Engineer, E.B.R., and Col. H. L. Woodhouse, Director of Civil Engineering, Railway Board.

Gas Explosion in Workshops

The explosion of an oxygen cylinder in the locomotive workshops of the North Western Railway at Moghalpura (Lahore) on September 18, resulted in the death of seven workmen and in injuries to 26; also in damage to the roof of the workshop. Medical aid was promptly rendered to the unfortunate victims. Explosions of this kind are very rare, though hundreds of gas cylinders are in daily use in the railway workshops.

Big Gap in Railway Finance

The report of the Public Accounts Committee on the Railway Appropriation Accounts for 1934-35, which was recently placed before the Legislative Assembly, contains a recommendation for the appointment of an expert to inquire into the present unsatisfactory state of railway finances and to suggest improvements. The committee considers that the solution of the problem of bridging a gap of something like Rs. 10 crores (£7½ million) per annum does not lie in mere accounting alterations such as the transfer of the burden of the strategic railways to the general budget, and the levy of public rates for the transport of Government materials.

Inter-Departmental Adjustment Unavailing

Such measures would only transfer liability from one department of the Government of India to another, leaving unaltered the position of the Central Government in regard to the financing of the constitutional reforms. It is in connection with the financial structure of the reformed constitution that the solvency of the railways assumes its special significance. The committee considers that the programme of remedial measures decided upon in connection with the rail-road controversy may have the effect of preventing further deterioration in the position of the railways, but will not bring back to them any substantial

amount of the lost traffic. In regard to the expectation of additional revenue to the extent of Rs. 1½ crores per annum from alterations in rates and fares, the committee understands that the Railway Board now considers that until the price structure in India has altered materially, there is little room for further large increases in rates and fares.

Appointment of an Expert in Management Recommended

In view of the magnitude of the gap to be bridged, the committee is of opinion that the position will not automatically be remedied in course of time even by the combination of: (a) a continuous, if moderate, trade improvement; (b) by all probable debt conversions; and (c) as a result of the revised scales of pay for new entrants. It is, therefore, suggested that an expert in railway management should be appointed, to recommend steps which would secure definite—other than mere hopes of increased revenues due to improving trade—improvements in railway finances, to the extent of about Rs. 3 crores per annum immediately, and, ultimately, of such magnitude as is required to maintain full solvency on a strict accounting basis. To avoid misconception, his terms of reference should exclude the possibility of securing this end by a mere transfer of liabilities.

Special Freight Rebate on Export Coal

The Government of India has sanctioned the grant of a special rebate of eight annas a ton in the railway freight on coal exported to foreign ports. This rebate is in addition to the rebate of 37½ per cent. now being given on all shipments of graded coal from Calcutta. At present most of the coal shipped from Calcutta is intended for Indian ports and coal interests have long been asking for a special freight concession to enable them to regain export markets lost to Indian coal on the imposition of an embargo on exports some twenty years ago. It is understood that the Ceylon Government Railway has decided to obtain its supplies of coal for next year from India.

From November 1, the East Indian and Bengal-Nagpur Railways will rescind the existing arrangement whereby a refund is made of the surcharge collected on the coal used for bunkering sea-going vessels within the limits of the port of Calcutta. The concession is withdrawn in order to obtain additional railway revenues, and it is believed that the consumption of bunker coal at Calcutta will not be seriously affected as Calcutta will still be one of the cheapest bunkering ports in the world.

NEW ZEALAND

Railway Films

The New Zealand Railways administration has just completed the production of an attractive talking film entitled "Steelways of the Pacific." This is now on exhibition throughout the country, and arrangements have been made for screening overseas. A natural colour film has also been produced to popularise travel by railcar, the trial run of the first railcar *Maahunui* being used to obtain the effects. It depicts the *Maahunui's* journey through the Wairarapa and the Manawatu, the luxurious comfort in which the passengers recline, and the effortless manner in which the car surmounted grades. Interesting scenes were also shown of the railway workshops, where other railcars, which will shortly be participating in regular services, are under construction. The Railway Department expects to recover the cost of production from the film exhibitors, who regard the film as good entertainment of an educational type. Arrangements are also being undertaken for exhibition in schools.

SOUTH AFRICA

New Oil Tank Wagon Design

The S.A.R. & H. administration has recently designed, built, and placed in service some remarkable tank wagons for petrol or heavy oil traffic. The capacity is 8,000 gal., or 27 tons of petrol or 34 tons of crude oil. The tank barrel is 40 ft. long and 6 ft. 6½ in. in diameter, with the upper plates ½ in. and the lower ones ⅜ in. thick; the pressed end plates are ½ in. To reduce weight to a minimum welding has replaced riveting, and the tare loading is only 21 tons. The under-frame, 41 ft. over headstocks, is carried on two diamond-frame bogies fixed at 30 ft. centres, and a corrugated galvanised semi-circular hood protects the tank barrel from the sun's rays.

UNITED STATES

The Railroads and the Election

The executives of the railway unions, with one or two minor exceptions, have endorsed President Roosevelt's candidature for re-election to another term, at the polling to take place on November 3. This action is unprecedented, since heretofore railway labour executives have divided their allegiance between the two major political parties. At the same time—while no open declaration has been made—railway managerial and supervisory staff for the most part are known to share the convictions of most business men, and to favour the Republican candidate, Governor Landon. The political cleavage has thus, for the first time, occurred on economic policy, a situation which will henceforth make American politics more closely com-

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parable with British; also politics are likely to have far more to do with relationships between employees and managements than in the past.

Railroad "Wonder Trips"

The New York Central and the Delaware & Hudson Railroads on September 20 ran an excursion—called a "railroad wonder trip"—from New York, the primary objective of which was to show the inside workings of these railways. Over 700 passengers made the journey, and other railways in the East have announced similar excursions for Sundays during the autumn months, all of them catering for the rapidly growing "fan" interest of the public in railway operation. With this end in view passengers on the New York Central "wonder trip" were first allowed to inspect a number of locomotives arranged in the terminal at Weehawken, N.J. (across the Hudson river from New York), with their drivers on hand to answer questions.

Leaving Weehawken, two trains were operated up the west bank of the Hudson river to Kingston, and thence over the heavily-graded Oneonta branch line through the Catskill mountains; there are three principal grades of approximately 1 in 50 and one, six miles long, of 1 in 30. At Oneonta the Delaware & Hudson workshops were inspected. Returning, the trains were operated over the Delaware & Hudson line to Albany, and thence back to Grand Central Terminal, New York, via the main line of the New York Central Railroad. The entire journey was approximately 400 miles and the fare charged was 16s. On each of the two trains there were two dining cars, one serving sandwiches and light refreshments exclusively, and the other offering a complete luncheon for 3s. and dinner for 4s.

Collection and Delivery Services

The Eastern railways are now awaiting the decision of the Interstate Commerce Commission as to whether it will permit them to institute collection and delivery of less-than-carload freight. The commission, it will be recalled, in April suspended this service by the Eastern railways on the eve of its inauguration, although it had previously permitted it in the East and South. Since that time extensive hearings have been held at which railways and traders have joined in defending the proposed service, while the road hauliers have objected to it. Attorneys for the parties in the proceeding have now filed briefs supporting their contentions with the commission. The suspension was ordered until November 1, so presumably a decision will be forthcoming before that time.

Traffic and Earnings

In spite of a continued improvement in railway receipts, detailed figures just issued by the Interstate Commerce Commission show that the railways as a whole in the first half of the current

year failed to earn their fixed charges (interest on bonded indebtedness) by £4,751,000. Their deficit in the first half of 1935, however, was much greater, being £12,309,000. With the improvement which has taken place thus far in the second half of the year, however, it appears that for the entire year the railways as a whole should be safely "in the black." Considering the state of their earnings, the railways' credit is surprisingly good.

GERMANY

Railways of East Prussia

Considerable attention has recently been directed to the subject of German transit traffic through the Polish Corridor, the restrictions placed upon it, and the agreement of August 13 last concerning Germany's indebtedness to Poland in this connection. [These were referred to in our issues of February 28, May 15, and September 4—ED. R.G.] It is interesting, therefore, to recall that the oldest line in East Prussia is from Marienburg to Königsberg, which was part of the original Eastern Railway of Prussia, and was opened on August 1, 1853. It was gradually extended towards Russia, until it reached the frontier at Eydtkuhnen in 1860. In 1857 this route was connected with other lines in Germany by the completion of the line from Marienburg to Dirschau, with bridges over the Vistula and Nogat. In 1864 work was begun on the East Prussia Southern Railway from Pillau via Königsberg to Prostken, the last portion of which, from Lyck to Prostken,

again linked up with the Russian lines, and was completed in 1871. The third principal main line, from Insterburg via Allenstein to Deutsch Eylau, was opened in 1872, and was connected a year later with Berlin via Posen when the Vistula bridge at Thorn was finished, and the Eastern Railway was at the same time linked with Berlin via Schneidemühl, on completion of the section between Konitz and Preussisch Stargard. The principal remaining sections opened were: Marienburg—Mlawa (1876-77); Insterburg—Lyck (1878-79); Allenstein—Lyck (1883-85); Allenstein—Kobbelbude (1883-85); Allenstein—Soldau (1887-88); Königsberg—Labiau—Tilsit (1889-91); Tilsit—Stallupönen, and Elbing—Osterode—Hohenstein (1892-94). By the end of the century the East Prussian lines had assumed substantially their present form.

Separation from the Reich

Until after the war all these lines continued to be worked as part of the Prussian State system, but the establishment of the Polish Corridor and the separation of Danzig and East Prussia from Germany proper by the Treaty of Versailles, created new frontiers, changes of administration, and direction of traffic flow in the case of many of these lines. [This aspect of the situation is dealt with in an editorial on page 603.—ED. R.G.] The accompanying map shows the lines in this territory as they now are. Their total length is 3,216 km. (1,998 miles; 11.1 km. to 100 sq. km.), of which 32 per cent., or 1,041 km. (646.8 miles)



Sketch map of the railways of East Prussia

are classed as *Hauptbahnen*, or main lines. The remainder are regarded as *Nebenbahnen*, or second class lines. The chief routes are from Marienburg to Königsberg and thence to Tilsit and Eydtkuhnen; from Deutsch Eylau to Insterburg; and from Königsberg via Korschen to Prostken, this being the old Süd bahn; it is single track between the first two places. Other important single line sections are Kobbelsbude—Allenstein; Königsberg—Pillau; and Marienburg—Marienwerder. There is a moderately heavy goods traffic over the Allenstein—Lyck—Insterburg, and Königsberg—Labiau—Tilsit sections, both of them single-line. Of light railways proper, or *Kleinbahnen*, there are 827 km. (513.86 miles) in the province, 143 km. (88.85 miles) being of standard gauge.

Improved General Conditions

On both main and secondary lines conditions have been greatly improved since the war. Speeds in particular have been and are being substantially raised, main line maxima being as high as 75 m.p.h. on some lines as compared with about 46 m.p.h. previously. Stations and station working have shared in the march of progress, and now the signalling arrangements are everywhere of good quality, and some installations are quite modern.

SPAIN

Railways under "Red" Rule

The "execution" is reported of the President of the Local Transport Committee of the "U.G.T." (Unión General de Trabajadores or General Union of Workers) in Barcelona; his predecessor suffered a similar fate only a few weeks ago. The body was found in the street and it is not known if he was "tried" by one of the tribunals, or if he was assassinated. Notwithstanding the warnings of the Anti-Fascist Committee, both in Barcelona and Madrid, these summary executions continue. Several railway officers in both cities, who occupied positions of responsibility before the civil war, have disappeared or are missing and their fate can only be conjectured, especially as it is notorious that there existed a black list of "undesirables" in the archives of the railway branches of the labour unions. Others are known to be in prison, ostensibly because of their supposed lack of loyalty towards the republic, but it appears that any official or person in a position of responsibility who may have offended the workers now in power by an undue insistence on discipline, or in any other way, is liable to be imprisoned or worse.

Cases are reported which appear fantastic and would be almost picturesque if they had not a tragic side. There is the case of a chief auditor on one of the smaller lines, who is actually engaged in digging a well in the courtyard of the local jail! Another case is that of a mechanical engineer who as

locomotive superintendent had the reputation of being a strict disciplinarian; he is now working as a labourer on road repairs with a prison gang near the scene of his earlier labours. Instances such as these might be multiplied indefinitely and unfortunately there are cases which have ended more tragically, such as that of the manager of a small railway in the south, who is said to have been done to death, with his secretary and traffic superintendent. There is no appeal in such cases, and even if there were a legal recourse, the workers' committees are not only torn constantly by internal dissension, but are quite unable to control their own people.

Workers' Control of the Ministry of Public Works

In the Ministry of Public Works itself, and presumably in all the other Ministries alike, the whole administration from the Minister himself downwards, is under the control of a "Workers' Council," a self-appointed body which inspires all the decisions of the Minister. It may be imagined that in a highly organised administration, normally run by a corps of engineers of mature age and proved experience, the invasion of all the technical departments by a rabble of more or less uneducated amateurs is not conducive either to economy or efficiency, however honest and well intentioned the newcomers may be.

For some time past the work of "purification" of the Civil Service has taken the form of the dismissal, with loss of pension and all other rights, of all officials suspected of lack of sympathy towards the present régime. Now it appears that these measures were not sufficiently comprehensive, and on September 29 the Madrid press reproduced from the official *Gazette* the text of a decree suspending the whole of the Civil Service. Those functionaries desiring to continue in their posts are to apply for reinstatement, which means a further weeding out, and a further replacement of experts—or worse.

Conditions Before War Broke Out

But even where the higher posts in the Ministry are occupied by qualified engineers or experts, the real decisions are dictated by mysterious personages who pass freely in and out of the one-time almost sacred precincts of the inner sanctum of the Ministry. This was indeed observable before the outbreak of the civil war, and to an ever-growing extent since the general election of February brought the Popular Front into power, the Ministry of Public Works, as well as the other Ministries, was under the control of the labour unions. One instance alone is sufficient to show the atmosphere that prevailed, even before the revolt. A deputation of railway workers was received by the Minister of Public Works, and among other things the petitioners complained of certain dis-

ciplinary action taken by the general manager of one of the larger companies: "And what have you done to him?" was the Minister's significant response.

As regards the actual working of the railways under "red" rule, it may be said that where military transport and the conveyance of munitions and food supplies do not demand complete militarisation, the public service is being run normally and with a fair regard for regularity and punctuality. At least this is the case on the main line between Port Bou on the French frontier and Barcelona, and between the latter point and Valencia. Passengers from France for Madrid are obliged to take this route, the only one open. The service as far as Barcelona is quite normal, and passengers can usually rely on getting through punctually to Valencia and from there to Madrid.*

Workers' Methods of Operation

Although services on the lines mentioned are being maintained with regularity it cannot truthfully be said that railway working, even on limited sections, is normal. The engines are used without any particular regard for rating or economy, and there is more than a suspicion, in the making up of rosters, of the same sort of control that obtains in other departments. Another rather serious feature of the actual working conditions is that repair schedules are entirely suspended, and engines and other rolling stock are being worked until they finally give out, when they are simply sidetracked and left, as are those which are damaged in the only too-frequent minor accidents. Although this is perhaps an inevitable condition of wartime, depreciation of material, of both rolling stock and track, is entirely disregarded. There will be a formidable reckoning when normal service is resumed on the railways in Spain.

CHINA

Canton-Hankow Railway

In spite of the political disturbances and military operations in Kwangtung, which had delayed the completion of repairs to the Pingchow-Shaokwan section of the Canton—Hankow line in that province, the work has now been finished, and the first train to run through from Canton to Wuchang—the northern terminus on the Yangtze opposite Hankow—left Canton on September 2. It carried 160 passengers and several officials, and, though making 90 intermediate stops, reached Wuchang in 45½ hours; the overall distance is nearly 700 miles. For the time being there will be two trains each way weekly, leaving the termini on Tuesdays and Fridays, and the regular schedule time for the journey will be 44 hr.

* The Valencia-Madrid main line was reported as cut by air bombing near Aranjuez a few days ago.—Ed., R.G.

BRITISH RAILWAY STATISTICS

"The Railway Gazette" monthly table for June, 1936, as compared with June, 1935, compiled from the Ministry of Transport Statement No. 199

Description	Great Britain*	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.
PASSENGER TRAIN TRAFFIC—					
Number of pass. journeys (ex. season ticket holders) ..	111,666,048	8,284,745	17,815,050	28,162,926	19,352,320
Increase (+) or decrease (-)	+ 2,789,432	- 139,078	+ 394,240	+ 586,362	+ 246,837
Passenger receipts (excluding season ticket holders) ..	£5,145,008	£671,585	£1,046,119	£1,753,036	£1,089,281
Increase (+) or decrease (-)	- £116,012	- £35,911	- £20,923	- £41,224	- £32,321
Season ticket receipts	£744,135	£45,199	£126,286	£192,120	£248,693
Increase (+) or decrease (-)	+ £71,163	+ £4,702	+ £10,278	+ £13,376	+ £28,530
Parcels and misc. traffic receipts (excluding parcels post)	£1,071,516	£192,990	£326,746	£393,860	£135,176
Increase (+) or decrease (-)	+ £12,421	- £1,131	+ £5,518	- £79	+ £3,227
FREIGHT TRAIN TRAFFIC—					
Freight traffic (tons) (excluding free-hauled)	20,601,898	4,722,028	9,423,219	9,559,260	1,209,459
Increase (+) or decrease (-)	+ 775,820	- 277,850	+ 347,064	+ 650,195	+ 19,792
Net ton-miles (excluding free-hauled)	1,193,638,668	219,894,913	398,980,095	491,269,380	51,193,782
Increase (+) or decrease (-)	+ 69,955,281	+ 3,589,073	+ 23,960,476	+ 41,581,471	+ 1,378,654
Average length of haul (miles) (excluding free-hauled) ..	57.94	46.57	42.34	51.39	42.33
Increase (+) or decrease (-)	+ 1.26	+ 3.31	+ 1.02	+ 0.91	+ 1.86
Freight traffic receipts	£6,496,790	£1,138,000	£2,020,000	£2,758,000	£365,423
Increase (+) or decrease (-)	+ £265,473	+ £18,000	+ £48,000	+ £172,000	+ 7,997
Receipts per ton-mile	1.306d.	1.24d.	1.22d.	1.35d.	1.71d.
Increase (+) or decrease (-)	- 0.025d.	-	- 0.05d.	- 0.03d.	+ 0.08d.
Freight train-loads: Average train-load (tons)	123.73	128.68	127.80	123.23	102.15
Increase (+) or decrease (-)	+ 2.63	+ 0.12	+ 1.78	+ 4.68	+ 0.60
Net ton-miles—					
Per train engine-hour	1,005.64	1,053.21	1,037.48	997.19	810.35
Increase (+) or decrease (-)	+ 1.92	- 14.22	- 0.89	+ 11.00	- 7.79
Per shunting-hour	863.13	779.21	935.20	914.53	555.86
Per total engine-hour	464.47	447.87	491.84	477.04	329.70
Net ton-miles per route-mile per working day	2,628	2,577	2,786	3,119	1,125
Increase (+) or decrease (-)	+ 155	+ 38	+ 162	+ 259	+ 9
Wagon-miles. Total	353,080,102	62,951,832	123,054,833	147,358,335	17,554,357
Increase (+) or decrease (-)	+ 16,165,324	+ 657,648	+ 5,670,924	+ 9,340,988	+ 339,254
Percentage of loaded to total	67.24	69.38	64.00	69.13	67.39
Wagons per train. Total	34.38	34.19	35.05	34.36	32.11
Increase (+) or decrease (-)	+ 0.33	- 0.10	+ 0.10	+ 0.62	+ 0.83
Loaded	23.12	23.72	22.43	23.75	21.64
Empty	11.26	10.47	12.62	10.61	10.47
Train-miles. Coaching—Per train-hour	15.29	14.37	14.55	14.74	17.59
Per engine-hour	12.12	11.36	11.20	11.19	14.29
Train-miles. Freight—Per train-hour	9.56	9.95	9.51	9.46	9.77
Per engine-hour	3.75	3.50	3.90	3.88	3.19
Engine miles. Total	48,905,446	7,688,841	13,522,155	18,182,582	6,510,562
Increase (+) or decrease (-)	+ 1,178,560	+ 165,404	+ 389,572	+ 446,187	+ 117,995
Mileage run by engines. Total train-miles—					
Coaching	25,549,422	3,492,382	5,988,910	8,488,788	4,813,534
Freight	10,269,899	1,841,377	3,511,118	4,288,975	546,701
Engine-hours in traffic. Total	5,045,459	859,497	1,507,948	1,945,806	527,710
Increase (+) or decrease (-)	+ 149,806	+ 13,645	+ 50,541	+ 72,695	+ 8,390
Shunting miles per 100 train-miles—					
Coaching	7.26	6.80	6.46	7.75	8.28
Freight	71.45	82.36	67.10	66.30	96.56

Passenger Traffic Statistics: Number of journeys, receipts, and receipts per journey (excluding season ticket holders)—June, 1936

Subject	Great Britain	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.	Cheshire Lines	Liverpool Overhead	L.P.T.B.†	Mersey
Full fares—									
Pass. journeys ..	31,588,873	722,398	1,185,677	1,597,659	2,945,982	17,055	156,107	24,075,864	75,145
Gross receipts ..	£950,589	£86,061	£138,038	£143,182	£227,611	£2,905	£1,594	£333,944	£1,335
Receipts per pass.	7.22d.	28.59d.	27.94d.	21.51d.	18.54d.	40.88d.	2.45d.	3.33d.	4.26d.
Reduced fares—									
Excursion and week-end—									
Pass. journeys ..	48,204,086	5,203,403	11,569,857	17,920,884	9,565,360	481,300	153,084	1,491,340	674,615
Gross receipts ..	£3,298,683	£479,296	£733,187	£1,322,383	£642,981	£32,393	£1,714	£34,411	£10,814
Receipts per pass. journey	16.42d.	22.11d.	15.21d.	17.71d.	16.13d.	16.15d.	2.69d.	5.54d.	3.85d.
Workmen—									
Pass. journeys ..	25,607,185	1,641,508	3,418,306	6,748,423	5,568,636	235,220	185,798	6,740,142	187,038
Gross receipts ..	£377,592	£24,972	£56,163	£110,282	£92,771	£4,119	£1,503	£75,428	£1,729
Receipts per pass. journey	3.54d.	3.65d.	3.94d.	3.92d.	4.00d.	4.20d.	1.94d.	2.69d.	2.22d.
Other—									
Pass. journeys ..	6,202,394	704,316	1,624,656	1,867,064	1,267,872	93,279	40,605	481,093	14,976
Gross receipts ..	£445,332	£65,447	£101,532	£142,477	£121,305	£5,409	£265	£4,890	£238
Receipts per pass. journey	17.23d.	22.30d.	15.00d.	18.31d.	22.96d.	13.92d.	1.57d.	2.44d.	3.81d.
Total—									
Pass. journeys ..	111,666,048	8,284,745	17,815,050	28,162,926	19,352,320	827,130	535,594	32,788,439	951,774
Gross receipts ..	£5,145,008	£671,585	£1,046,119	£1,753,036	£1,089,281	£45,083	£5,076	£448,673	£14,116
Receipts per pass.	11.06d.	19.46d.	14.09d.	14.94d.	13.51d.	13.08d.	2.27d.	3.28d.	3.56d.

* All standard gauge railways

† Includes passengers originating on the railway undertakings, and on the Whitechapel and Bow Joint Railway

SIGNALLING DEVELOPMENTS IN THE IRISH FREE STATE*

By H. J. GUTHRIE, M.Inst.R.S.E., Technical Assistant,
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WHEN the Irish Free State came into being in 1922 there were 15 separate railway companies operating within it, the principal ones of which were the Great Southern & Western and the Midland Great Western, representing approximately 72 per cent. of the country's total route mileage. All the companies operating completely within the Irish Free State were amalgamated in 1924 as the Great Southern Railways, comprising some 2,150 route miles, of which 1,986 miles were 5 ft. 3 in. gauge and 164 miles 3 ft. 0 in. gauge, while of the 5 ft. 3 in. gauge lines approximately 460 route miles were double. There were also 150 route miles of other company's lines, principally those of the Great Northern Railway of Ireland.

The railway companies had just about restored order after the rebellion of 1922-23, during which time considerable damage was done to railways and communications, no fewer than 200 signal cabins alone being totally destroyed.

General Features

The signalling system in use was purely mechanical, that on the lines of the larger constituent companies being more or less uniform and in good condition, while the smaller lines had installations of all types, in anything but good condition. The double line block was Harper's single wire instruments, while for single lines the electric train staff was in general use, except for two branch lines equipped with tablet instruments, and a few sections with manual train staff. The signals were, and are, of the two-position lower quadrant type, reinforced concrete signal posts had just been introduced and have since been used extensively; point rodding was principally wrought-iron channel rod, which is now standard, the remainder being tubular round rod. The lever frames were of various patterns. Nearly all had tappet locking, though quite a number had cam and rocking shaft, or cam and tappet, locking. A few pieces of early signalling apparatus are still to be found.

Prior to amalgamation, the Great Southern & Western was the only company in the Free State which manufactured its own mechanical signalling material, all the others procuring their supplies from manufacturers. On amalgamation, the policy of the Great Southern & Western was continued, when new central workshops were constructed, which now supply the demand of the whole group system.

Hand Generator System

The first development of any importance since the amalgamation was the introduction in 1924 of the hand generator system of point and signal operation at Charleville Junction, on the Dublin-Cork main line. This was very successful and many installations have been carried out. A photograph of the first hand generator and slide frame is reproduced in Fig. 1. It is still in use and giving every satisfaction. The later model is a little different. The hand generator, when operated at between 60-80 revolutions per minute, will generate between 100-140 volts d.c. and can deliver up to 1.2 amp. without undue exertion, enabling a double-ended pair of

points to be reversed comfortably in 6 to 8 seconds. The slide lever frame embodies a circuit controller for each slide together with one or two electric locks per slide as required for the appropriate normal or reverse or indication locks, &c. The slides are interlocked between themselves and also when necessary can be connected into the interlocking of the adjoining mechanical frame. The point

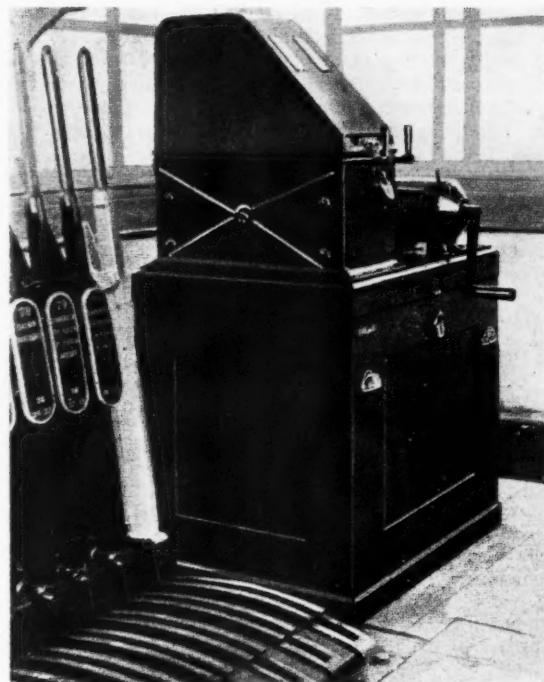


Fig. 1—First hand-generator and slide frame

and lock machines are standard 100-volt d.c. machines incorporating a polarised relay, whereby only two line wires are required for operation for each machine. The signal machines are also standard 100-volt d.c. models, except that the holding off coil is arranged to be held by a 10-volt battery situated in the cabin and common to all such signals worked therefrom. The transition between "pulling off" at 100 volts and "holding off" at 10 volts is accomplished by a bridging relay with suitable characteristics, so that no cessation of current occurs. Each signal has one line wire for operation and a common return, the repeating being carried out in the usual way. An interlocked circuit controller is provided in the cabin by means of which all current is cut off to or from the points when it is necessary to hand-crank a point machine.

The hand generator system lends itself particularly well to the operation of isolated junctions from the nearest station cabin, and considerable annual savings have been obtained. Figs. 2 and 3 show two cases of single to double line junctions, with both-way running on one of the double lines. This arrangement saves a double line

* Abridgment of paper read before the Institution of Railway Signal Engineers on Wednesday last, October 14.

October 16, 1936

junction—which these two junctions were—with consequent permanent way department saving, and simplifies and cheapens the signalling scheme, there being in the first case only one crossover and one signal, and in the second

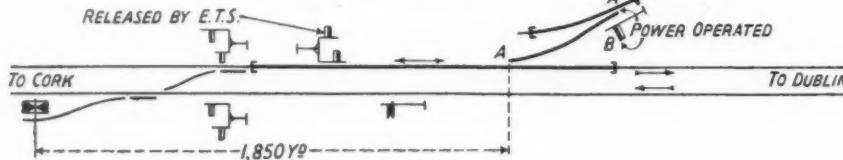


Fig. 2—Charleville junction layout

case one crossover and three signals to be power operated. The main line distant signal B_2^1 in Fig. 3 is operated over the home signal wires extended via an arm proving contact and a track circuit control; thus the one slide and two wires suffice.

A typical single line junction hand generator installation is shown in Fig. 4, which is self explanatory, but it is to be noted that it was stipulated in all cases that the signal leading to a single line section should be released by the respective electric train staff. This will be referred to later.

At two single line junctions it has been possible to dispense with the signal cabin and all signals worked therefrom, by power operating the points by hand generator from the nearest station, and electrically interlocking the points with the electric train staff instruments of each of the branch sections concerned. This latter was accomplished by means of a special slide lever frame, the arrangement of one installation being as shown in Fig. 5. Electric locks on slides A and C are respectively in the Ballycumber and Ferbane electric train staff circuits, while slide B controls the points, the three slides being suitably

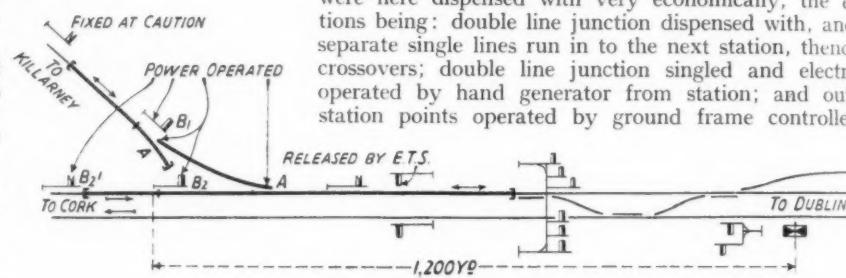


Fig. 3—Killarney junction layout

electric train staff and subsidiary electric train staff instrument provided. This latter will be referred to again.

Amalgamation of Cabins

From 1925 onwards the centralisation of signal cabins at several yards and junctions (made feasible by amalgamation) was carried out; the cabins, which in nearly every case were all-mechanical, ranged in size up to 11L0 levers. They include nothing special for comment except that in some cases facing points are being mechanically worked at 425 yd. from the cabin, an arrangement giving every satisfaction.

As previously mentioned, when the hand generator schemes, and

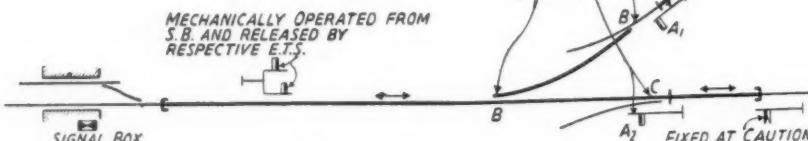


Fig. 4—Usual single line junction layout (hand generator)

interlocked. Without going into details it will be appreciated that it was thus ensured that an electric train staff could not be withdrawn from the electric train staff instruments unless the points were set for that line and the appropriate slide operated; and that the points having been set could not be moved once a staff was out. No track circuits were necessary, the whole arrangement being simple in the extreme, and yet meeting fully the traffic requirements at these places.

Regarding the distance for satisfactory operation under this system, it is to be noted that in the Multyfarnham-Inny Junction installation, the points and signals are

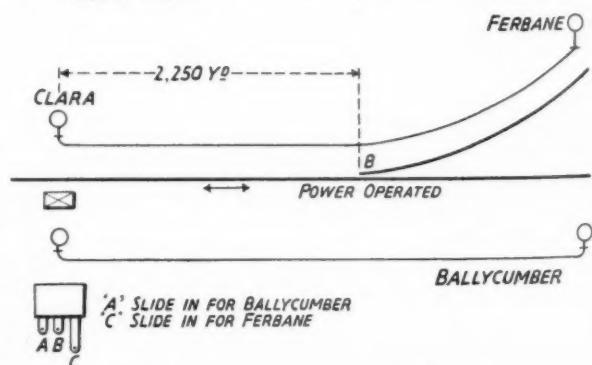


Fig. 5—Clara and Banagher junction

3½ miles from the cabin, which probably constitutes a record for this method of operation, though not the maximum limit. It should perhaps be mentioned that the main run of wires—usually about 16 in number—is carried out in open telegraph construction, using low poles and 150-lb. per mile bare copper wire. This is the most economical arrangement available and has been found very satisfactory and trouble free.

A good example of what can be done under suitable circumstances by the re-arrangement of track and application of the hand generator system is shown in Figs. 6A and 6B, which give the arrangement of the Collooney-Ballysodare line before and after re-signalling; four cabins were here dispensed with very economically, the evolutions being: double line junction dispensed with, and two separate single lines run in to the next station, thence via crossovers; double line junction singled and electrically operated by hand generator from station; and outlying station points operated by ground frame controlled by

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also the first isolated cases of singling of line with through running, were being installed, it was considered necessary to have the starting or entering section signal for the single line section concerned released by the respective electric train staff, consequently starting signal control was adopted and standardised for these purposes. Considerable numbers have been installed, the type used being all mechanical, and illustrated in Fig. 7. The arrangement consists of an attachment to the electric train staff instrument with an interlocked key, which is released only on the withdrawal of a staff, the key being then used to release the starting signal lever by means of a lock thereon. The key must

portions of line were equipped with switching out apparatus of new design.

Various special pieces of apparatus were installed to suit particular conditions. One such case was where it was required to close the junction cabin of a branch line to a

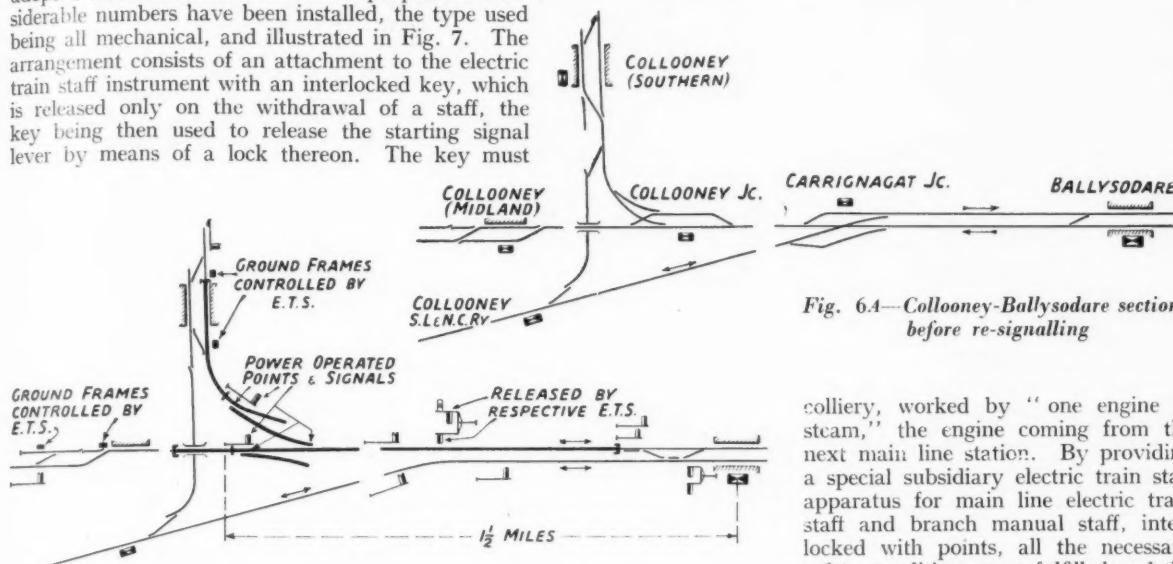


Fig. 6B—Collooney-Ballysodare section after re-signalling

be returned to, and locked in the instrument to enable "train entering section" or any bell signals to be given from the instrument from which the staff was withdrawn; though bell signals can at all times be received. Thus the signalman has to restore and lock the starting signal at "danger" in order to complete his train signalling duties, and incidentally the signalman at the other end of section, on hearing the block bell, is assured that this has been done.

Single Lines

On a railway system of which the major mileage is single lines, it is only natural that quite a few developments were applicable to them. Up to 1927 there was only one installation of single line switching out apparatus in the Irish Free State, situated on the former Cork, Bandon, & South Coast Railway. With the insistent call for economy, attention was focussed on this aspect of operation, and several

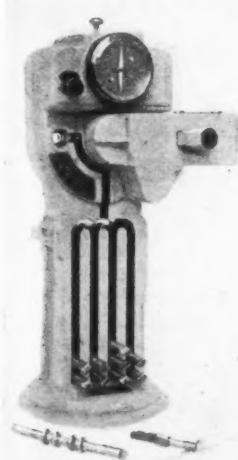


Fig. 7—Starting signal control lock

colliery, worked by "one engine in steam," the engine coming from the next main line station. By providing a special subsidiary electric train staff apparatus for main line electric train staff and branch manual staff, interlocked with points, all the necessary safety conditions were fulfilled and the economy effected. It was also found possible to close several single line station cabins by using only one platform for passengers, and operating the loop or other points giving access to goods siding by ground frame controlled by electric train staff and providing a subsidiary instrument at the station. The function of the subsidiary electric train staff instrument should perhaps be explained.

It often happens that a train has to follow or pass a goods train already occupying a section, and that the latter has to stay for a time at one of these intermediate stations or sidings with points controlled by section staff. To avoid delay, the goods train having entered the siding and cleared the main line, the section staff is placed in the subsidiary instrument, thus phasing up the section instruments and allowing the section to be used. The staff can be recovered for the goods train only on the section being clear and current received from both of the section instruments. It can, of course be arranged to have more than one subsidiary instrument per section.

Double Lines Converted to Single

Traffic receipts were continuing to fall and every possible avenue of economy was being explored, when in 1928 it was decided to take the bold and drastic step of singling 140 route miles of double line track. This change was made possible only by a special arrangement of signalling and apparatus to give the required express running and flexible traffic working. Fig. 8 shows a typical single line station

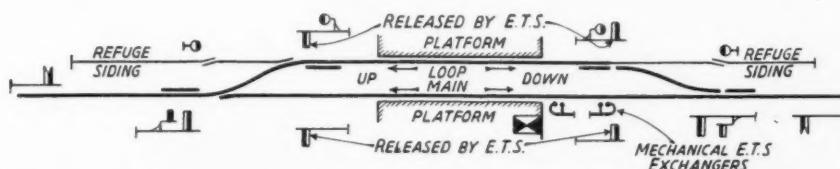


Fig. 8—Layout of station after singling of line

layout with double way signalling. The straight through line allows fast running in either direction, speeds of 60 m.p.h. being usual with the mail trains. With trains approaching single line passing stations and the adjoining single line section at these speeds, it was deemed necessary to provide special protection in the signalling arrangements. The starting or entering section signals at each end of the station are released by the respective electric train staffs; the home signals read for the straight through line only and are released by the main line starting signals for their direction, while the distant signal applies only to the straight through line and is released by its home signal. It will, therefore, be evident that unless the section ahead is clear, the driver has three signals against him, and that if, after being checked at the distant, he gets the home, he is assured of a clear road ahead. The call-on signal reads into either platform, utilising both loops to fullest advantage, and the refuge sidings allow for expeditious crossing of trains. A view of one end of a single line station is shown in Fig. 10.

The exchange of electric train staffs for express working is carried out by means of mechanical exchanging apparatus, the locomotives being fitted on both sides for right hand or left hand exchanging; the instruments are operated by magneto generators. Sections were grouped for switching-out purposes and equipped accordingly, the through section instruments being of the uni-directional permissive type, the first installation of its kind on a British or Irish Railway. An illustration of this type of instrument is shown in Fig. 11. The apprehension felt by many as to the success of the scheme has been unfounded. The single tracking has been well justified, yielding considerable initial and annual savings and meeting traffic requirements.

Activities of Signal Department Extended

In 1929 the Signal and Telegraph Department took over control of all the station electric lighting and power installations, cranes, and hydraulic machinery, &c.

Signal Lighting

The standard of lighting in semaphore signals, which is generally deplored, has been immensely improved in some of the larger yards by the introduction of electric lighting, and at the same time good savings have been obtained by dispensing with the lampmen concerned. It will, perhaps, be of interest to know the lamp arrangement adopted to obtain satisfactory operation, as a lamp in a semaphore signal is subject to considerable vibration and shock when the arm returns to normal. Carbon filament lamps are not obtainable under 40-watts, and are, therefore, not an economic proposition, especially with the high cost of current outside Dublin. Ordinary 15-watt 200-220-volt lamps for normal supply voltages gave satisfactory lighting, but even when mounted on spring supported anti-vibration holders, breakages were very frequent. It was then decided to provide 12-volt 12-watt standard motorbus lamps with their inherent robust and concentrated filament, on a spring suspension, using existing lamp cases. Instead of feeding each lamp by a separate transformer, groups of 10-15 lamps were fed by one transformer. The arrangement proved extremely successful and cheap in installation, breakages being negligible.

Electric Signalling

When any of the larger yards is being renewed, and mechanical signalling is retained, the opportunity is taken to replace the facing point bars with track circuits, which is a decided improvement, particularly from a maintenance

viewpoint. The current for tracks and locks, &c., is taken from a secondary battery with metal rectifier trickle charging equipment.

The year 1934 saw the introduction of colour-light signalling on the railways in the Irish Free State, the first installation being at Amiens Street (Dublin), with searchlight signals and mechanically operated points.

The first all-electric signalling was carried out at Westland Row, one of the principal stations of Dublin, in 1935, and contained several novel features. The layout comprises four lines of track, two being through passenger lines, with five platforms, the one signal cabin, which replaced two, controlling $1\frac{1}{2}$ route miles. To obviate the heavy cost of the usual power frame, a miniature type

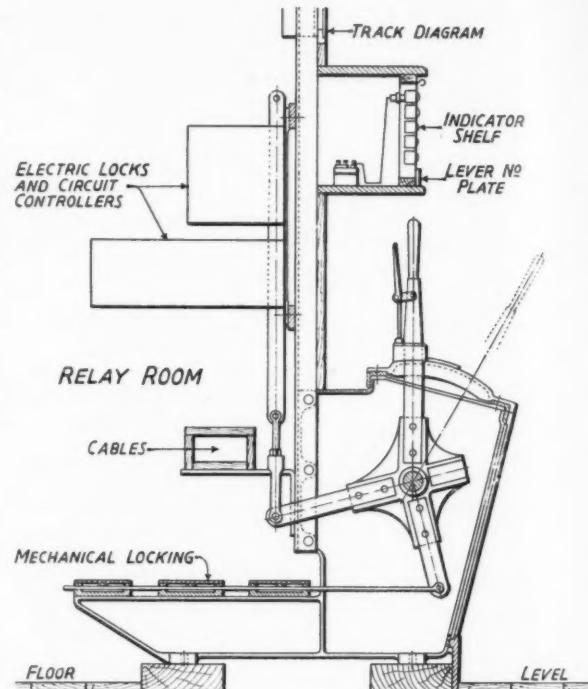


Fig. 9—Section through power frame at Westland Row

mechanical lever frame has been designed to perform the same functions, and is shown in Figs. 9 and 12. The lever frame is mounted on the cabin floor and at the back are mounted electric lever locks and circuit controllers, standard components of usual design, and which are connected to the lever tails. There is a cradle every ten levers, the pitch being 4 in., and the lever centres are mounted on a common shaft without intermediate support. The frame is interlocked with standard tappet locking as used with mechanical operation, which is at the back of the frame above floor level. The primary objective in adopting this type of lever frame was economy in first cost, nevertheless a great advantage accrues in maintenance and alterations by using standard units for the interlocking. The staff has only one type and size of interlocking to take into consideration, with mechanical or power frames. In this installation the back of the frame with its electric locks and back of cabin diagram above, form one side of the relay room, giving a compact arrangement and yet everything is easily accessible. The front of the frame has polished timber panels. The unprepossessing arrangement of unit indicators and repeaters

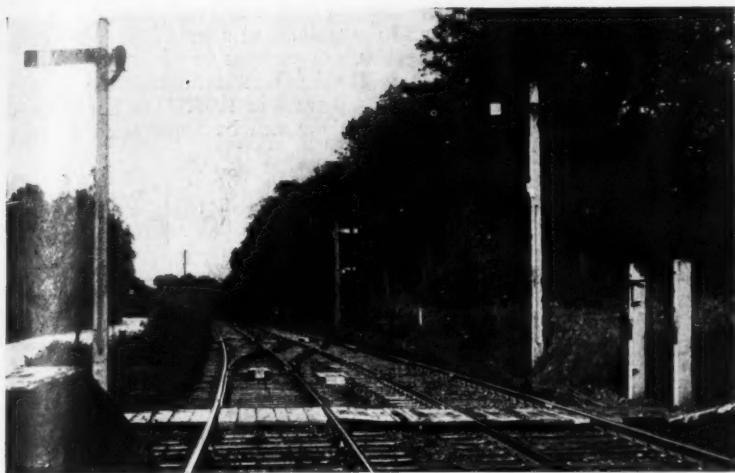


Fig. 10 (left)—View of single line station.

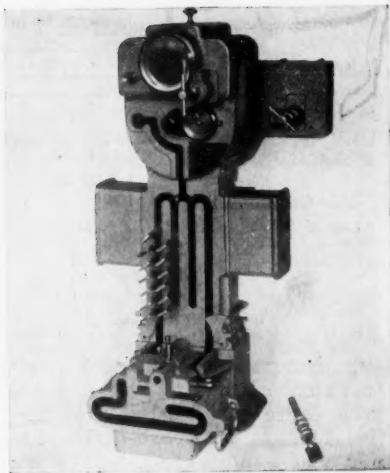


Fig. 11 (right)—Uni-directional permissive E.T.S. instrument

usually found, except on power frames, was overcome by the adoption of a composite instrument shelf, as shown in Fig. 12, which makes a very attractive and simple job, and also facilitates wiring. No lever badges are provided on the levers, the lever number and mechanical releasing only, engraved on ivorine plates, being fixed at the bottom of the shelf, directly over the levers. Immediately over the indicator shelf is the illuminated diagram.

No standby plant is provided, but power feeds are taken from three different substations in the city with a suitable switching arrangement in the signal cabin. The outside apparatus and method of operation follow more or less usual practice, being 110-volt d.c. point machines fed direct off rectifier, a.c. detection, d.c. searchlight signals, a.c.-d.c. track circuits, and a.c. line relays. The outside wiring was carried out with single insulated wires run in timber trunking, the wire being of a type known as N.J.S.S. which is a 750-volt vulcanised rubber, anthygon protected and braided, weather and acid proof cable. The cabin itself, which is of unusual design, is shown in Fig. 13.

Where the signal cabin is arranged in storeys the electric locks and controllers are on the floor below, but rigidly connected to the frame, and the relays and rectifier, &c., are of course also housed below. This arrangement is to be used in a scheme at present under consideration. The accessibility and robustness of the arrangement will be appreciated.

Another installation on the above style and contiguous with the two mentioned, is nearing completion at West Road (Dublin), from which cabin one single line and four double line junctions are operated, and $5\frac{1}{2}$ route miles controlled.

Automatic Light Signals

The first automatic colour-light signalling installation in the Irish Free State is already under way, comprising 3 miles of double line three-aspect signalling. It is a straightforward job, with condenser fed track circuits and multiple lens type signals; the only change from the usual equipment being that the three lamps of each signal will be fed from a common transformer, instead of three separate

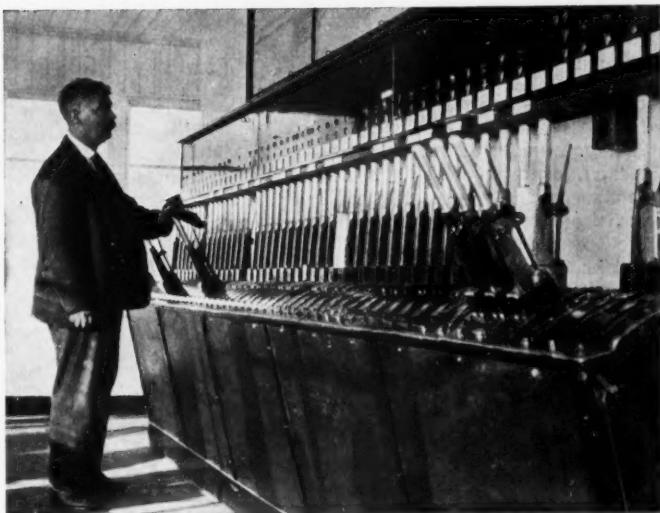
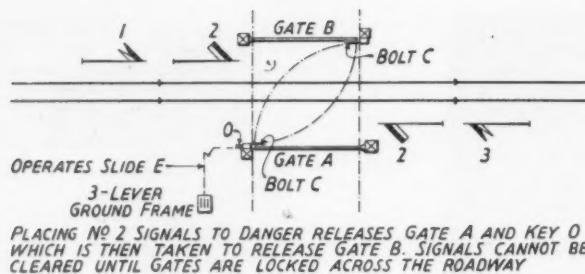


Fig. 12—Power frame in Westland Row box



Fig. 13—Exterior of Westland Row box



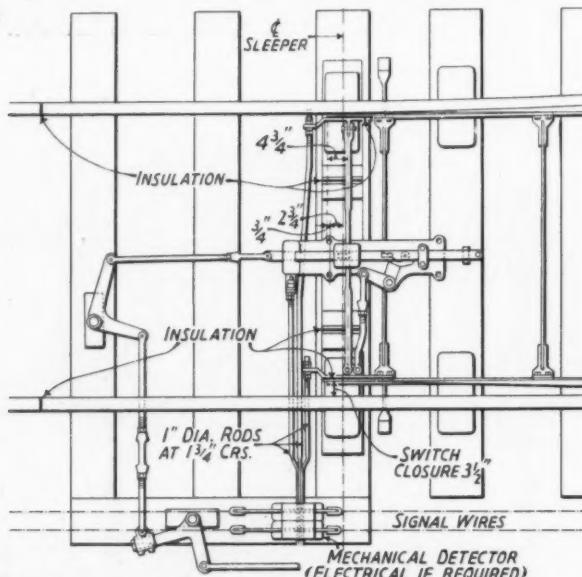
transformers. For the main run of wires, however, as the number of wires is small, it has been decided to provide insulated wires on telegraph poles with swan-neck insulators as the most economical method of construction. No doubt more colour-light signalling installations will be considered and embarked upon, but the scope for the economic application of this type of signalling in the Irish Free State is limited.

Level Crossings

A problem which has assumed grave proportions with the large increase of road motor traffic and improved road conditions is the protection of level crossings, with which the Irish Free State Railways are amply "blessed"? A large number of these crossings is not signalled or interlocked, or only partially so, but steps are being taken to remedy this. The standard layout adopted for giving the necessary protection is shown in Fig. 14 on which the sequence of operations is set out. The actual gate lock is illustrated in Fig. 15. This arrangement requires no rod connections or trunking across the public road, and makes a cheap, safe and robust job.

Improved Designs of Equipment

Along with the more important and interesting developments, various improvements have been taking place of a more or less minor nature, to signalling equipment,



chiefly in the matter of design and adoption of standards. A few notes and illustrations of some of the work carried out in this direction will perhaps be of interest. Fig. 17 is an illustration of a cabin and mechanically operated gates that were erected early in 1935. The large windows giving unobstructed views will be appreciated, while the

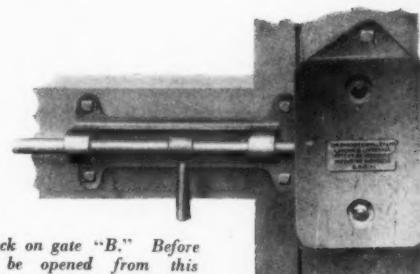
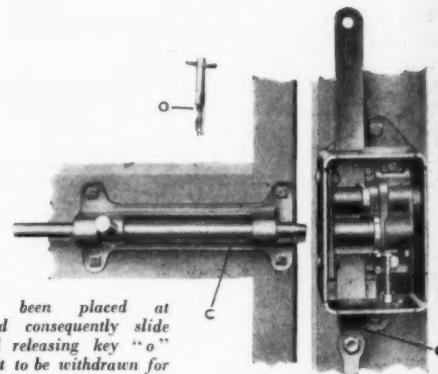
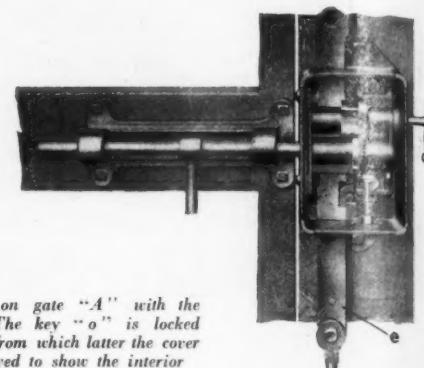


Fig. 15—Gate lock

flat roof, which gives a modern touch, also reduces the cost of construction. It will be noticed that the hanging gate posts are neat cast iron pillars. They are mounted on a semi-circular plate securely fixed over a circular concrete pit to house the gate heel and operating gear, the other half circular plate being removable, the general idea being to procure a sound clean job and to facilitate maintenance.

In facing point gear a new design of economical F.P. lock has been evolved, principally to reduce costs, and the layout, which is used a great deal, especially where track circuits replace bars, is shown in Fig. 16. The

lock incorporates bolt detection, and the absence of practically all sets in rods will be noted.

Signal Aspects and Fittings

In signalling aspects there have been no radical changes—excepting the introduction of colour-light signals—the lower quadrant semaphore signal being still in general use. Distant signal arms are painted red, but the old

readily appreciated when the financial position of the Irish Railways during this period is considered, and which has been particularly bad. It is to be hoped, however, that these profitable yields will not always be expected, as with the return of better times improvements in certain directions will no doubt be desirable, in which the usual return on expenditure is not obtainable. The schemes should nevertheless be proceeded with.

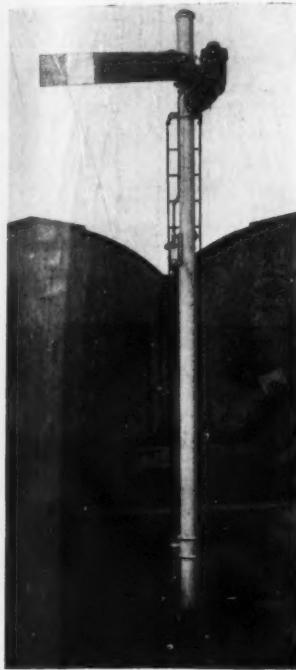


Fig. 17 (above)—Tralee signal box

Fig. 18 (left)—Tubular signal

white vertical bands on the arms have all been changed to the now usual > band to match the fishtail; the night aspect continues to be red or green. Distant signals, wherever possible, are being located at 1,000 yd. from the first stop signal, while on the branch lines, which are all single line, and where no through running is provided and hand exchange of staffs is carried out, they have all been fixed at "caution" to reduce maintenance, it being considered unnecessary for them to be worked.

Signal fittings and reinforced concrete posts were early standardised and have undergone no change; the type can be seen in Fig. 10, but this year, to cheapen production and installation costs, particularly at level crossings, a signal with tubular steel post and fittings to suit has been evolved, shown in Fig. 18. The post, the bottom portion of which is well treated with bituminous compound to prevent corrosion, is fixed in the ground on a large cast iron sole plate secured by struts. A ground disc signal with banner type signal aspect is also in course of production. In signal lamps the stepped lens has been adopted in place of the bull's eye lens, to obtain improved lighting, while the Welch patent long burning burner, has been standardised for all lamps, whether extinguished during daylight or not, for reasons of economy.

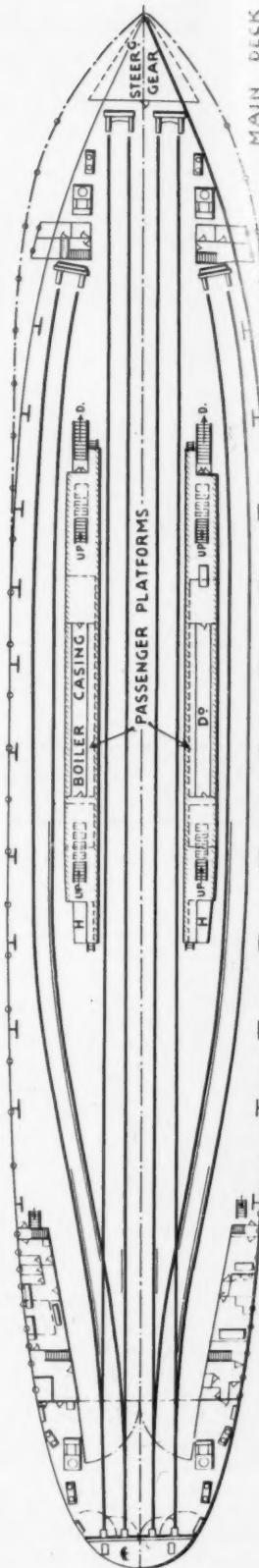
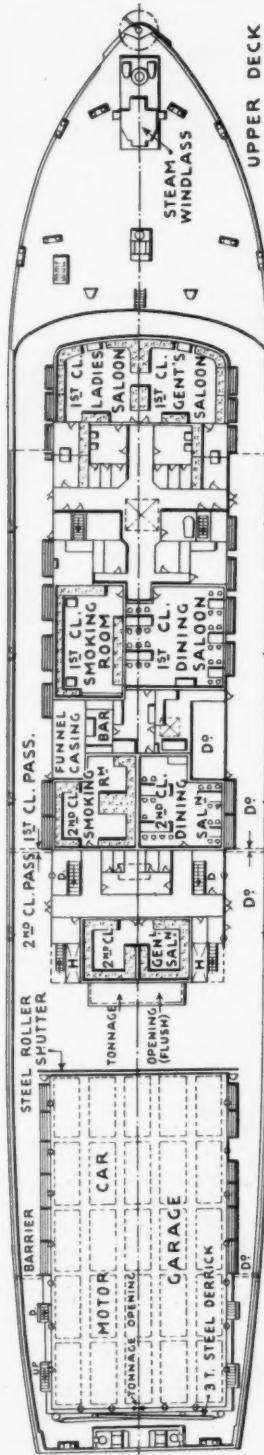
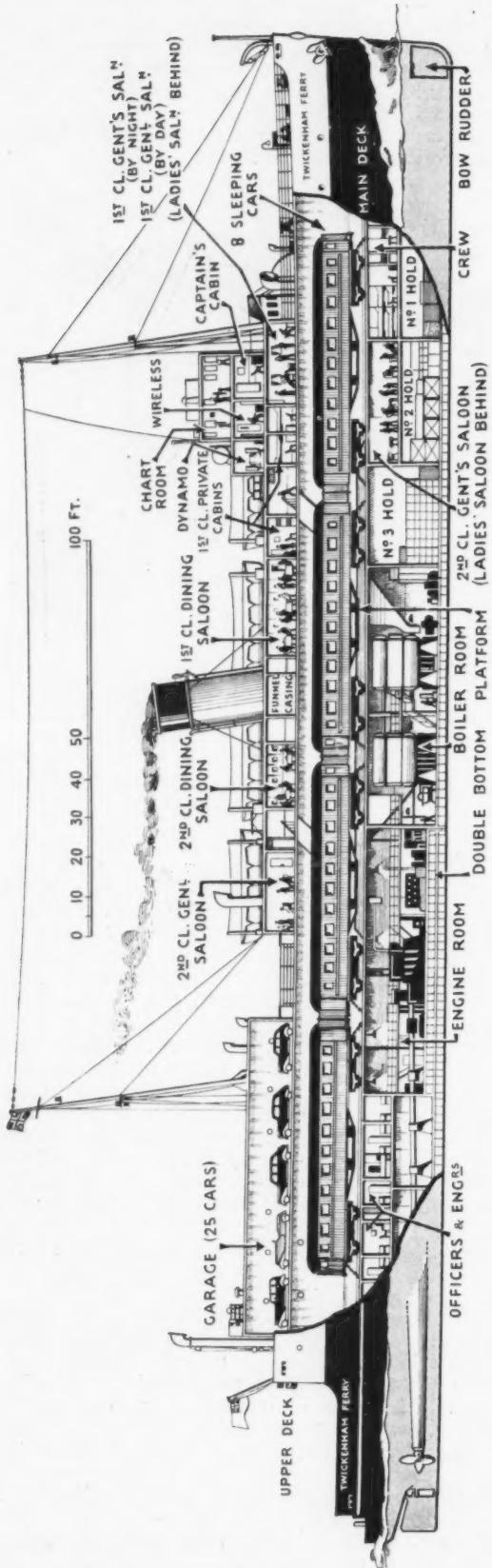
The outstanding feature of the signalling developments in the Irish Free State during the last 14 years is the attainment of economies and reduction of traffic operating costs, the cause and stimulus without doubt being decline of traffic and falling receipts. There have been very few improvements effected for their own intrinsic value, the primary reason being monetary saving, which no doubt is a laudable objective. The reasons for this will be

That improved working and greater safety are not inconsistent with reduced working costs, is shown in the power signalling installations, where, as is usual, one power frame replaced two or more manual frames, not possible by mechanical means. The drawback to power working, however, which militates against its adoption on a larger scale, is the high initial cost, which it has been endeavoured to reduce.

It is hoped it will be agreed that signalling developments in the Irish Free State are maintaining steady progress and, while keeping abreast of the times, meet the particular conditions obtaining. The country can also claim to be the birthplace of some original ideas in the art of signalling. As a measure of the efficacy of the signalling equipment and operating personnel, it is gratifying to note that there has not been a fatal accident on a running line of these railways for the last twenty or thirty years, apart from two or three recently at level crossings.

Following the reading of the paper on Wednesday before a meeting of the Institution of Railway Signal Engineers held in London, a discussion ensued. Various questions were put to the author, some touching on points not dealt with in the paper, such as the present position regarding railway safety legislation in the Irish Free State. In reply, Mr. Guthrie gave additional interesting information that was much appreciated. The speakers were Mr. W. S. Roberts, President of the Institute, and Messrs. H. E. Morgan, B. F. Wagenrieder, G. H. Crook, H. M. Proud, E. W. Challis, C. H. Hills, J. Ashton, P. Lomas, and T. S. Lascelles.

October 16, 1936



Sectional view and deck plans of the new Dover-Dunkerque train ferries

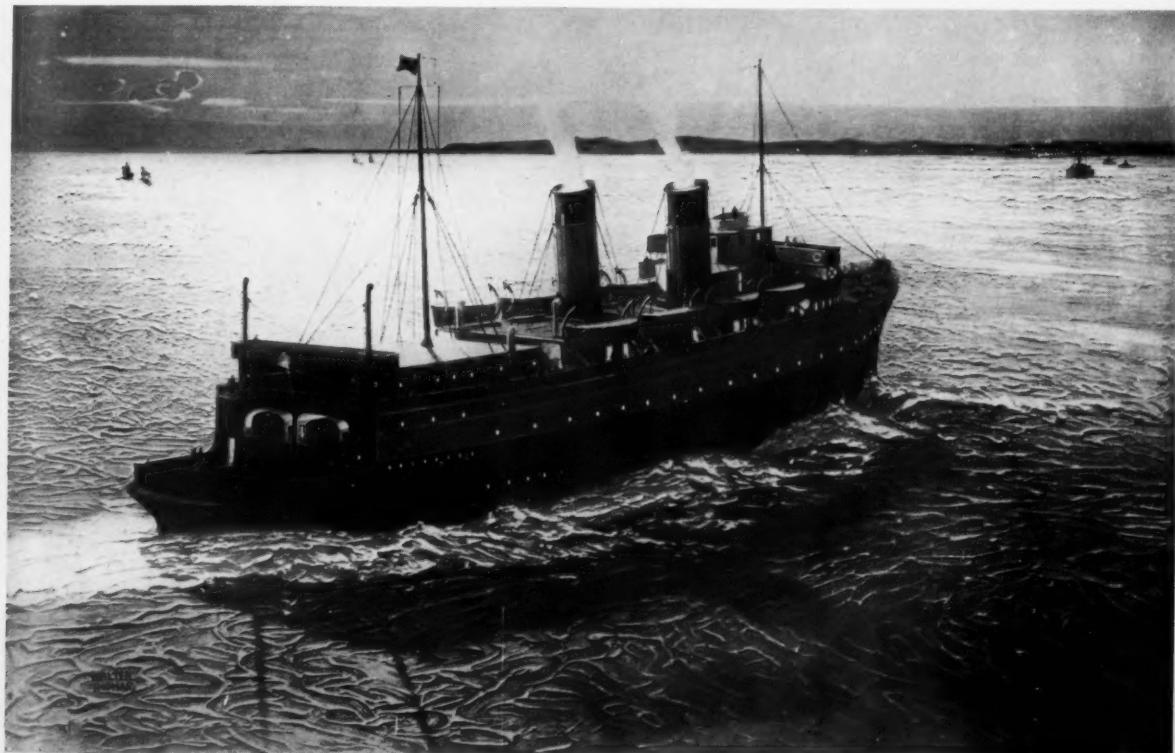
NEW CHANNEL FERRY SERVICE

The new service of through sleeping cars between London and Paris has been inaugurated this week by the Southern Railway and the Chemin de fer du Nord

WITH the conveyance last Tuesday of the first passenger train from Paris to London on the new train ferry across the Channel, the long discussed schemes of direct travel between the two capitals was fulfilled. This train was a special conveying railway officers and guests in connection with the inaugural ceremonies which took place prior to the introduction of the regular public service on Wednesday night in each direction. A fortnight ago we published a detailed description of the dock works necessary for berthing the train ferries at Dover, works which, it is scarcely an exaggeration to say, have proved one of the most formidable engineering tasks that have yet been successfully overcome. The extreme variation of tide, amounting to as much as 25 ft., which occurs at Dover was, in conjunction with the rough seas in the Channel, sufficient to guarantee that the job would be no light one. Even when, after the original plans for the dock had been drawn up, the fissured nature of the chalk bottom was discovered, necessitating the complete revision of the constructional scheme, the magnitude of the difficulties was by no means revealed. These difficulties and the manner in which they were overcome have already been described by us in the article referred to, and to the average traveller between London

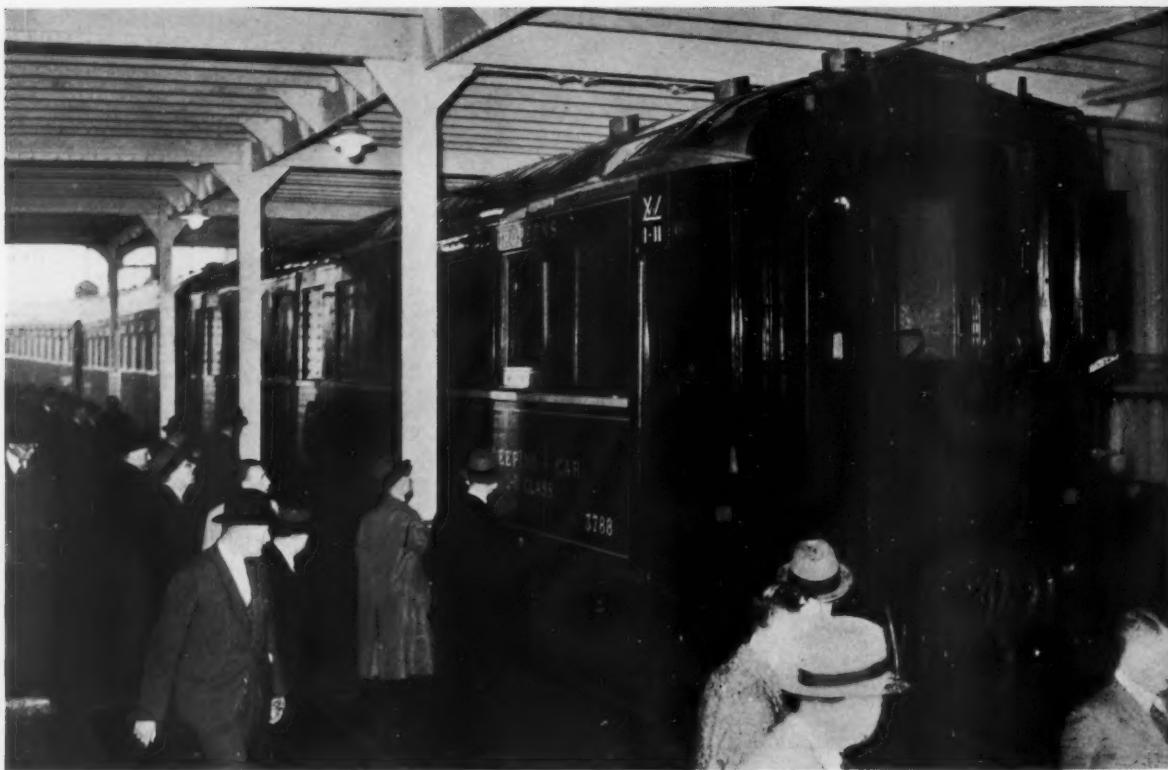


The new London-Paris sleeping car route



Impressive painting by Mr. Walter Thomas of one of the new train ferries in service, which forms the basis of a quad royal poster issued by the Southern Railway Company. Special technique was used in the preparation of this poster, the sea being made in bas-relief and then photographed. Some of the colouring was done by colour photolithography, and the other by the normal lithographic process

October 16, 1936

*The departure**Just before arrival**Loading the train on the "Twickenham Ferry" at Dunkerque***BY THROUGH SLEEPING CAR**

October 16, 1936

THE RAILWAY GAZETTE

621



Undisturbed sleep



The morning coffee

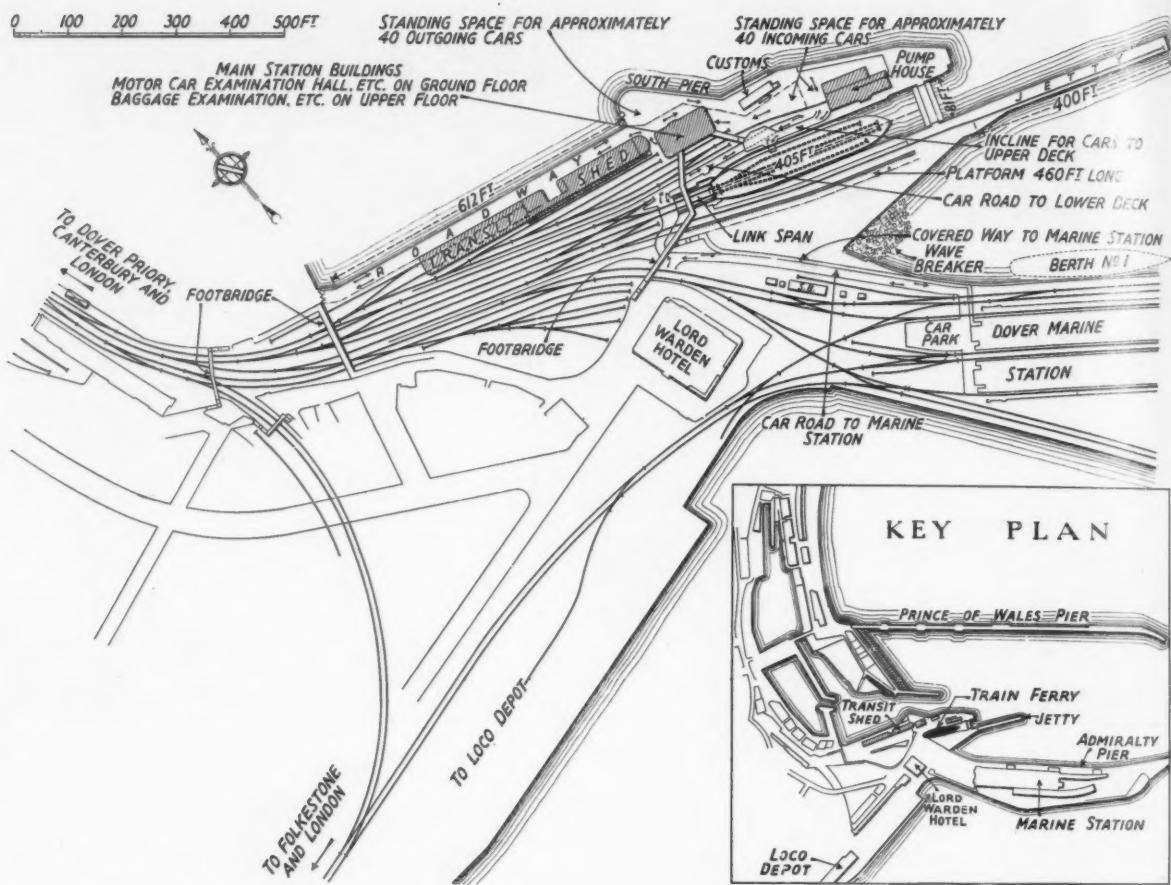


Getting ready for the arrival

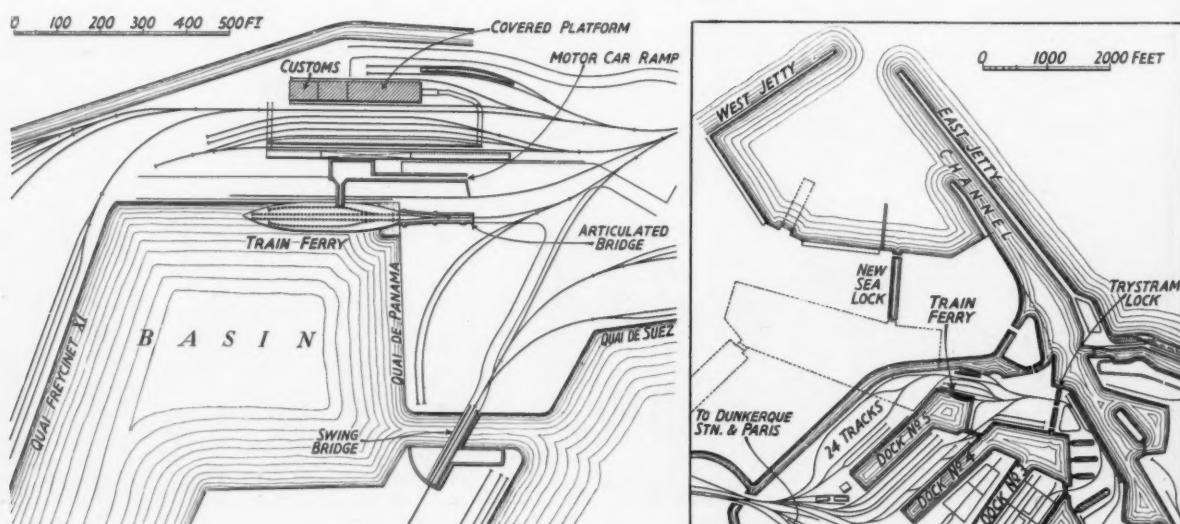


BETWEEN PARIS AND LONDON

October 16, 1936



The new train ferry dock at Dover. Its construction was described and illustrated in our issue of October 2



Train ferry facilities at Dunkerque showing the loading and unloading arrangements on the left, and the rail connection with the main line on the right

and Paris who benefits by their accomplishment will never be realised.

Mr. R. Holland-Martin, Chairman of the Southern Railway Company, on board the *Hampton Ferry* last Monday at Dover, referred to the problems which had faced the engineers in constructing this dock and congratulated Mr. George Ellson, the company's Chief Engineer, Mr. F. Whyte, the Resident Engineer, and the contractors, Messrs. E. Nuttall Sons & Company and J. Mowlem & Co. (Joint) Ltd., upon having overcome them. The French Ambassador, M. Corbin, officially performed the inaugural ceremony by waving a green flag as the signal for several sleeping cars to be shunted on board the ferry. He then proceeded to the pump house and there pressed a button which gave the signal for lowering the dock gates so that the *Hampton Ferry* could steam out. Previously, on board, in addressing the large gathering of those present, he had expressed his confidence in the success of the new route in stimulating traffic, increasing trade, and enhancing Franco-British friendship.

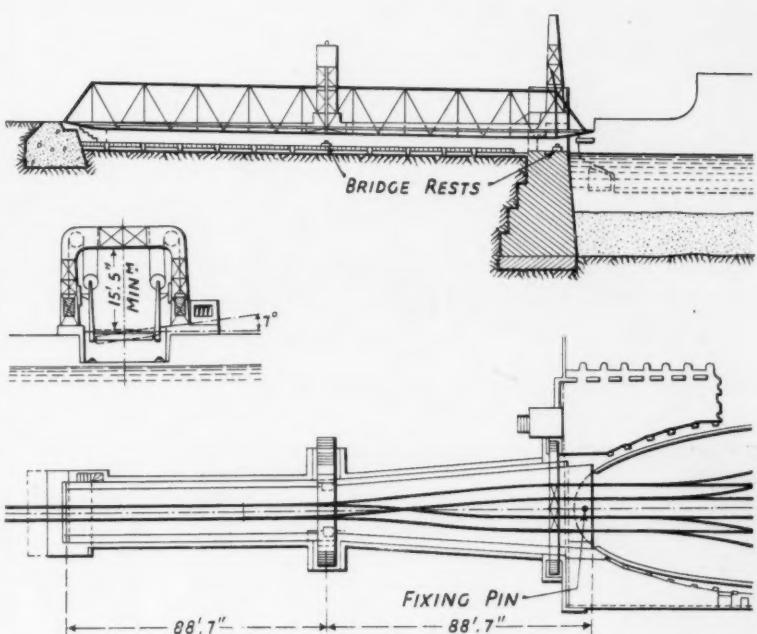
The *Hampton Ferry* conveyed the guests to Calais, and during the voyage there was ample opportunity to inspect the vessel, one of three specially constructed by Swan, Hunter & Wigham Richardson Limited at the Neptune Yard, Walker-on-Tyne, and which were described in THE RAILWAY GAZETTE of March 23 and August 3, 1934. The other two ships are the *Twickenham Ferry* and the *Shepperton Ferry*, the former of which has been handed over by the Southern Railway Company to the Soc. Anon de Navigation Angleterre-Lorraine-Alsace. The design and construction of the vessels were carried out under the general direction of Sir Westcott Abell.

The vessels are 360 ft. in length, 60 ft. in breadth, and 20 ft. in depth to the train deck and have a normal draught of 12 ft. 6 in. Four lines of rails are provided giving space for 12 sleeping cars or 40 goods wagons. Passengers in the sleeping cars alight on platforms on the

train deck and obtain access therefrom to the deck above where there is passenger accommodation including lounges, cabins and the first class restaurant. Another restaurant, and further accommodation for second class passengers, are provided below the train deck. An isolated garage for 25 cars, which need not have their petrol tanks emptied, is situated at the after end of the upper deck. It is possible for motor road vehicles also to use the train deck, the surface of which is level with the rails.

The propelling machinery consists of geared turbines constructed by the Parsons Marine Steam Turbine Co. Ltd., supplied with steam by Yarrow type water tube boilers, coal fired by means of Taylor mechanical stokers. The normal speed of the train ferry steamers is 15 knots. The maximum dead weight carried, apart from the weights necessary for the operation of the vessels in average conditions is 1,200 tons.

On arrival at Calais the party was taken by special train to Paris where a dinner was given by the Northern Railway of France, the Southern Railway, and the International Sleeping Car Company. M. Ramadier, deputising for the Secretary of State for Public Works, presided, and speeches were made by Baron de Rothschild, Chairman of the Nord, Baron Snoy, Chairman of the International Sleeping Car Company, Mr. R. Holland-Martin, Chairman of the Southern Railway, as well as by Sir George Clerk, British Ambassador to France, and Sir John Simon, British Home Secretary. In congratulating those concerned with the fruition of the long discussed scheme of direct communication between London and Paris, M. Ramadier conferred upon Sir Herbert Walker, General Manager of the Southern Railway, the Order of Commander of the Legion of Honour, and upon Mr. C. Cooper, Assistant to the

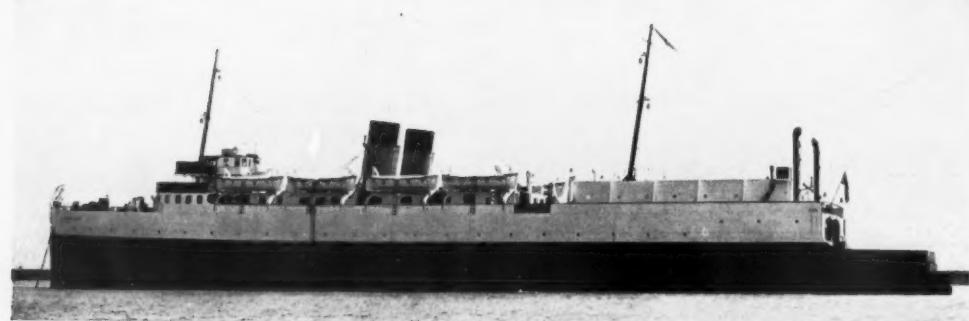


Arrangement of the articulated bridge at Dunkerque



Articulated bridge between land and ferry boat at Dunkerque

October 16, 1936

*Broadside view of the "Twickenham Ferry"**First class bar**First class lounge**Above : Interior of one of the channel ferry steamers, showing the four tracks, which, together, carry 12 sleeping carriages, or 40 loaded goods wagons**Left : Stern view of the "Twickenham Ferry"*



View near Shortlands of the first sleeping car train from Paris to London

Traffic Manager, S.R., for Continental Traffic, the Order of Chevalier of the Legion of Honour.

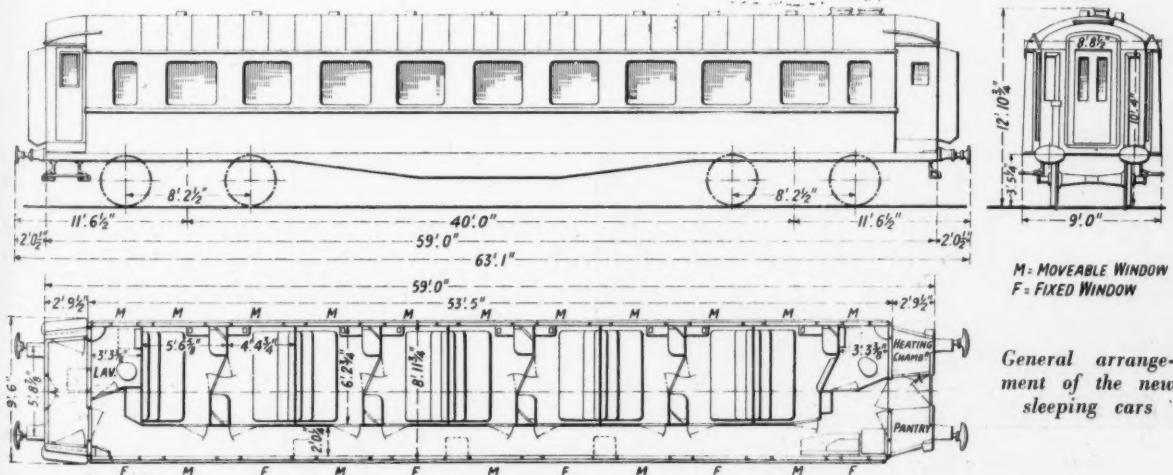
After dinner those returning to London left the Gare du Nord shortly before midnight in two trains, each composed of six of the new sleeping cars, and reached London in the same vehicles about 10 a.m. on Tuesday morning.

Twelve sleeping cars have been built at Blanc-Misseron, by the Ateliers de Construction du Nord de la France et des Mureaux, for the International Sleeping Car Company, of dimensions smaller than the normal Continental cars in order that they may run over the Southern Railway between Dover and London. These are shown in the diagram reproduced herewith, taken from THE RAILWAY GAZETTE of March 23, 1934. They are generally similar to the all-metal sleepers built on the Continent during recent years, and incorporate a hot water boiler, and a service compartment for making tea or coffee, both accommodated on one of the end platforms, access to the car being arranged between them from the vestibule connection with the next car, as well as from the opposite end platform. By this arrangement the maximum passenger accommodation has been provided within the more moderate British loading gauge dimensions. Each of the nine compartments has two berths and provides accommodation for either first or second class passengers. The first class passenger has a compartment to himself, while

two second class passengers are accommodated in one compartment. Each car weighs 55 tons and has an overall length and width of 63 ft. and 9 ft. respectively. They are all mounted on SKF roller bearings.

For goods traffic a large number of 4-wheeled wagons have been built by the French Nord, P.L.M., and P.O.-Midi Railway Companies, as well as by the Italian State Railways. The Southern Railway also has built a number, and, in addition, special vans for passengers' luggage to accompany the sleeping car trains have been provided by the Southern and the Nord.

The problem of dock accommodation at Dunkerque was totally dissimilar to that at Dover and had already been solved in the main during the war when special arrangements had been made for dealing with the train ferry services that plied between Richborough and that port, and have subsequently been in operation between Harwich and Dunkerque. At this port there existed already a fairly complete system of dock gates. The quay for the ferry boats is in the swinging area of dock No. 5, in the angle formed by the Quai de Panama and its continuation towards the Quai Freycinet No. 11. Access will normally be through the Trystram lock, but, in the rare event of the lock being unusable as the result of bad weather, the vessels will be able to pass through the Guillain lock, the approach to which is much less affected by heavy seas.



Eventually, on completion of the works in the outer harbour, the ferries will enter through the new lock—280 m. (918 ft. 9 in.) long by 40 m. (131 ft. 3 in.) wide—which is already finished but is not yet connected with the existing arrangements at the port. The approach to the ferry-boat quay will then be much simplified. Rolling stock passes from the quayside lines to the ferries by means of an articulated bridge, built in two sections with a central pivot, which compensates, without undue sharpness of gradient, both for variations in the water level due to the tide, and for settling of the vessel as it is loaded. For the use of passengers not travelling in the through sleeping cars, a station building has been erected with booking and exchange offices, and customs facilities. This building has a flat roof, reached by a staircase from the customs hall, from which an articulated gangway, similar to that already described in connection with the embarkation of railway rolling stock, leads to the upper deck of the ferry. There is also a ramp leading from the quay to the station roof, by means of which motorcars can be driven on to the ferry via the gangway. Customs sheds for goods traffic have also been built adjacent to the railway lines, and these have road connection for the convenience of local consignments. At Dover, similar facilities are also being



Left to right : The French Ambassador, Mayor of Dover, Sir John Simon, Mr. E. Gore-Browne, Mr. R. Holland-Martin, Lord Willingdon, Lord Rockley, Mr. George Ellson

Group at inaugural ceremony at Dover

arranged for passengers who do not use the sleeping cars.

Among those who participated in the inaugural ceremonies were :—

Sir Westcott Abell, Messrs. Belmonte (Italian State Railways), Berget (Nord), R. P. Biddle (S.R.), W. Bishop (S.R.), Bourgeois (Nord), F. A. Brant (A.L.A.), Bugniet (Sleeping Car Company), Cambournac (Nord), Sir George Clerk (British Ambassador in Paris), Sir Stenson Cooke, Messrs. C. Cooper (S.R.), Corbin (French Ambassador in London), H. W. Corry (S.R.), Sir George L. Courthope (S.R.), Mr. E. C. Cox (S.R.), Sir Herbert J. Creedy (War Office), Major L. F. S. Dawes (S.R.), Messrs. de Fleuriau (former French Ambassador), de Kerdrel (London Representative, French Railways), Baron G. de Rothschild (Nord), Mr. de Waru (Nord), Sir Francis Dent (S.R.), Lord Ebbisham (S.R.), Messrs. J. B. Elliot (S.R.), G. Ellson (S.R.), V. D. Fay (Dean & Dawson), Garcey (Sleeping Car Company), Getten (Nord), E. Gore-Browne (S.R.), Granholm (Swedish State Railways), C. Grasemann (S.R.), C. Gribble (S.R.), G. H. Griffith (Pullman Car Company).

Messrs. Henry-Graard (P.O.-Midi), R. Holland-Martin (S.R.), J. R. Hind, A. Howis (S.R.), C. G. Huskisson (Thomas Cook & Son), Sir Robert Kindersley, Messrs. H. C. King-Stephens (S.R.), Lancronen (Nord), Latrasse (Nord), Le Besnerais (Nord), Leverre (International Union of Railways), C. A. G. Linton (S.R.), E. F. E. Livesey (S.R.), Henry Mansbridge (S.R.), Margot (Sleeping Car Company), M. G. J. McHaffie (S.R.), D. McQueen (S.R.), R. E. L. Maunsell (S.R.), Mayer (Nord), L. A. de L. Meredith (Travel Association), E. J. Missenden (S.R.), S. J. Morgan (S.R.), T. Morison, Mugnot (P.L.M.), Sir Evelyn Murray (Customs and Excise), Messrs. P. Numa (S.R.), Pellarin (Est), Poirson (Dean & Dawson), Col. H. C. Prescott (S.R.), Messrs. Renevey (O.C.E.M.), H. E. Roberts (S.R.), Lord Rockley (S.R.), Messrs. Charles Sheath (S.R.), H. A. Shart (S.R.), Sir John Simon (Home Secretary), Baron Snoy (Sleeping Car Company), Messrs. Surleau (A.L.), G. S. Szlumper (S.R.), Sir John E. Thorneycroft (S.R.), Messrs. Tirard (Midi), Varenne (Sleeping Car Company), Count Volpi (Sleeping Car Company), Sir Herbert Walker (S.R.), Messrs. Weill Rabaud (Ministry of Public Works), F. E. Wentworth Shelds (S.R.), H. E. O. Wheeler (S.R.), F. Whyte (S.R.), Widhoff (Sleeping Car Company), Lord Willingdon (Lord Warden and Admiral of the Cinque Ports), Mr. Woyt (Sleeping Car Company), Sir Edmund Wyldbore Smith (International Sleeping Car Company), Mr. F. J. Wymer (S.R.).

Messrs. R. L. Beck and H. A. Henry (Nuttall & Mowlem [Joint] Limited), Sir Henry Japp, Messrs. G. Burt, W. Joyce, M. Maddison, and W. Robertson (John Mowlem & Company), and Mr. Sureau (Ateliers de Construction du Nord de la France et des Mureaux).

For the use of the sleeping cars a supplement of £1 12s. 6d. is charged for first class passengers and £1 5s. 6d. for second class passengers. These supplements include reservation fees and the gratuity to the sleeping car attendant. Customs and passport formalities are carried out on the train going to Paris. In the reverse direction the French examination takes place shortly after the train leaves Paris and at Victoria upon arrival. Ordinary first, second and third class carriages are attached to the boat trains between Victoria and Dover, and the passenger accommodation on the ferry boats is available for passengers travelling in them, who have to pass through the Customs examination between arrival at the Dover Marine station and boarding the ferry at the dock.



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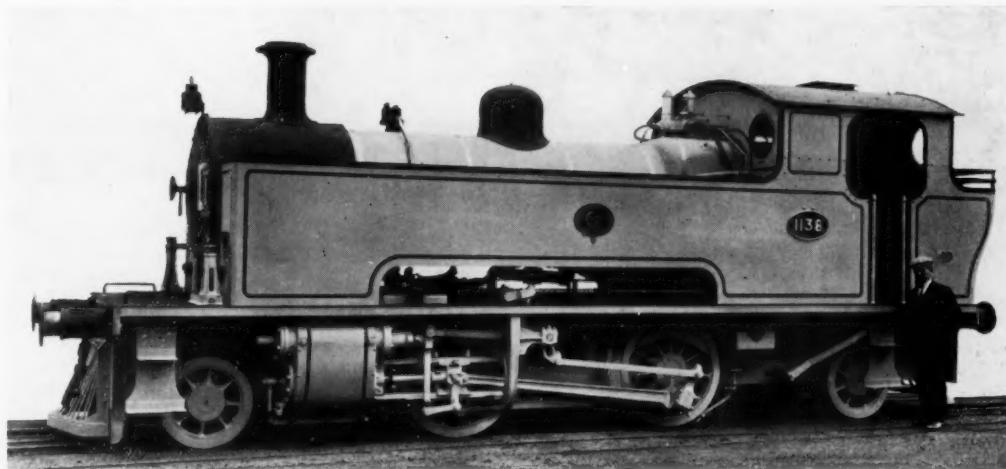
Victoria	dep.	10.0 p.m.
Dover Marine	arr.	11.36 "
" " Ferry	dep.	11.40 "
" " Ferry	arr.	11.48 "
Dunkerque Ferry	dep.	12.35 a.m.
Dunkerque Town	..	..	..	arr.	4.30 "
" " Town	..	..	..	dep.	5.10 "
" " Paris	..	..	..	arr.	5.28 "
Paris (Nord)	..	..	..	dep.	5.29 "
				arr.	8.55 "

Paris (Nord) ..	..	..	..	dep.	9.50 p.m.
Dunkerque Town	..	..	..	arr.	1.12 a.m.
" Ferry	..	..	..	dep.	1.12 "
Dover Ferry ..	..	..	..	arr.	1.30 "
" " Marine	..	..	..	dep.	2.0 "
Victoria "	..	..	..	arr.	6.15 "
" " Victoria	..	..	..	dep.	6.39 "
" " Victoria	..	..	..	arr.	6.47 "
" " Victoria	..	..	..	dep.	6.50 "
" " Victoria	..	..	..	arr.	8.30 "

Direct connections by through trains are also given from Dunkerque to Brussels and to Basle, arriving respectively at 10.32 a.m. and 4.7 p.m.

NEW 2-4-2 TYPE TANK LOCOMOTIVES FOR THE EGYPTIAN STATE RAILWAYS

Fifteen of these engines have just been completed by W. G. Bagnall Limited, of Stafford, for use on the Minieh Auxiliary Railways



One of the fifteen new tank engines

ON page 192 of THE RAILWAY GAZETTE dated February 2, 1934, there appeared a short description and on page 188 a photographic reproduction of a 2-4-2 type tank locomotive built by W. G. Bagnall Limited of Stafford for the 2 ft. 6 in. gauge Mysore Railways. This same firm has just recently completed fifteen locomotives having the same wheel arrangement but differing in proportions and other characteristics, for the Egyptian State Railways, the engine in this case being for the 4 ft. 8½ in. gauge.

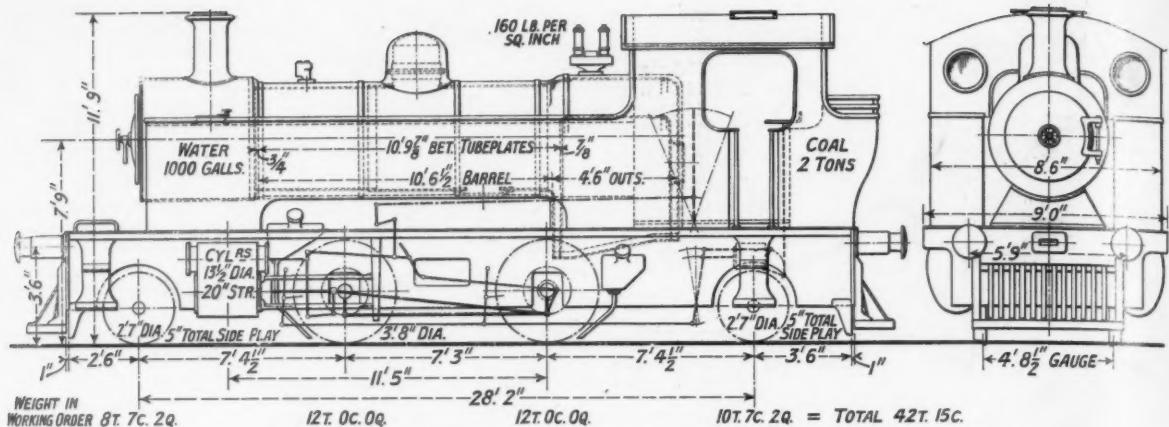
The engines have been constructed to the requirements of the Chief Inspecting Engineer of the Egyptian Government, London, and are intended for use on the Minieh Auxiliary Railways. They are of simple straightforward design having outside cylinders driving the rear coupled wheels and piston valves actuated by Walschaerts gear arranged for inside admission, lever reversing gear being employed. The boiler is of the Belpaire type fitted with copper interior firebox; it is designed for a working pressure of 160 lb. per sq. in., and feedwater is supplied to the boiler through top feed clackbox. A water lifting appliance is fitted on one of the tanks to enable water to be taken from the canals alongside the railway. Sandboxes, with gravity feed, are fitted at each end of the coupled wheelbase for forward and backward running.

The capacity of the tanks is 1,000 gallons and the bunker will hold two tons of coal. In working order the locomotive weighs 42½ tons of which 24 tons is available for adhesion, a maximum axle load of 12 tons being thus obtained. The maximum weight per foot run of wheelbase is 1·94 tons. The tractive force at 85 per cent. of the boiler pressure is 11,266 lb. and the ratio of adhesion 4·325.

The following are the leading dimensions:—

Cylinders (2), diam.	..	..	..	13½ in.
Piston stroke	..	..	..	20 in.
Coupled wheels, diam.	..	..	..	3 ft. 8 in.
Leading and trailing bogie wheels, diam.	..	..	..	2 ft. 7 in.
Rigid wheelbase	..	..	..	7 ft. 3 in.
Total wheelbase	..	..	..	22 ft. 0 in.
Length of engine over buffer beams	..	..	..	28 ft. 2 in.
Boiler heating surface—				
Tubes	..	..	..	635·5 sq. ft.
Firebox	..	..	..	71·5 "
Total	..	..	..	707·0 "
Grate area	..	..	..	13·0 "
Boiler pressure	..	..	..	160 lb. per sq. in.

The engines on completion were shipped to Port Said for delivery to the Minieh Auxiliary Railways. Included in their equipment are the following fittings:—Two 2½ in.



Dimensions of new tank locomotive for Egyptian State Railways

Ross pop safety valves; water lifter on left hand tank supplied by Sir W. H. Bailey & Co. Ltd., Salford, Manchester; water gauges on firebox back, Dewart & Co., London; two "Evrit" blow-off cock with stainless steel

valves; self contained buffers, Geo. Turton, Platts & Co. Ltd., Sheffield; two No. 7 self-acting injectors, Davies & Metcalfe Ltd.; lubrication of the cylinders by means of a two-feed British Detroit lubricator.

Machining Locomotive Parts of Intricate Shape at Crewe Works, L.M.S.R.

THREE has recently been installed at the Crewe works of the London Midland & Scottish Railway a new Pearn Richards horizontal surfacing and boring machine, which is seen in the accompanying illustration.* This is used for machining various locomotive parts of intricate shape, such as motion girders, blast pipes, regulator bottom castings, bogie stretcher castings, and other similar components. In the illustration it is seen machining a pump body for the vacuum brake, the operations including boring, chamfering, and facing flanges. Two of these components will also be recognised on the floor behind the operator, and in the foreground are other parts dealt with on the same machine.

The floor-to-floor time for completely machining one of the pump bodies is 3 hr., and the bore, which is 5 in. in diameter by 2 ft. 9 in. long, is done in two cuts, as follows:—

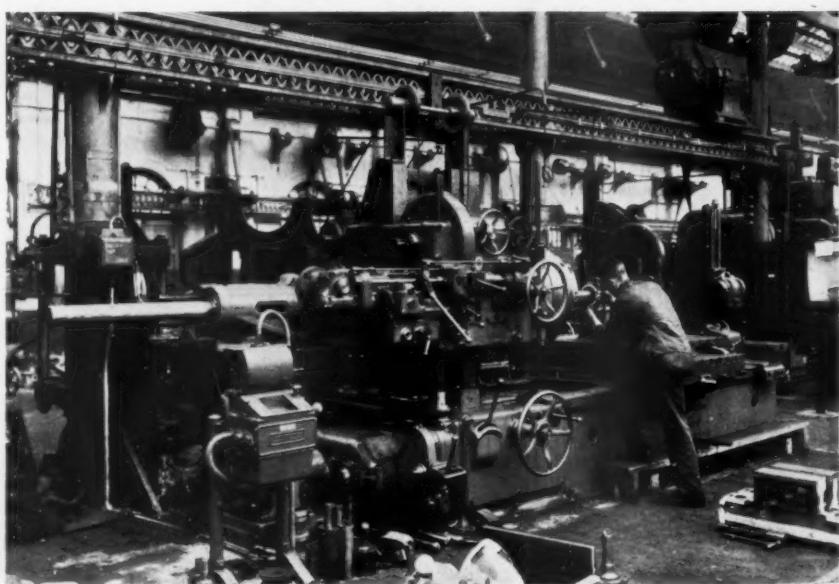
One rough cut at 170 ft. per min., with feed of 0.014 in.; depth of cut, $\frac{1}{8}$ in.

One finish cut at 222 ft. per min., with feed of 0.010 in.; depth of cut, $\frac{1}{16}$ in. Tungsten carbide tools are used for all operations.

The machine is fitted with a traversing spindle 3 1/2 in. dia., having a total traverse of 5 ft. 0 in. The automatic facing head will face up to 42 in. dia., eight feeds ranging from 0.02 in. to 0.25 in. being given to the tool slide. The facing head has 24 speeds, ranging from 2:58 to 220 r.p.m., and the traversing

spindle has 32 speeds from 2:58 to 250 r.p.m. The main table is 5 ft. 0 in. by 3 ft. 0 in., and has a longitudinal traverse of 5 ft. 0 in., and a cross traverse of 4 ft. 0 in. The top revolving table is 3 ft. 6 in. by 3 ft. 6 in. and this can be raised and lowered for facility in rotating with heavy loads.

Eight feeds, ranging from 0.01 in. to 0.125 in., are provided to the table longitudinally and transversely; to the spindle frame vertically, and to the traversing spindle horizontally. The machine embodies all the latest improvements in this class of tool, including Richards' patent prismatic slide to the upright, and covered guideways on bed. It is also fitted with Murray's patent colour control to the speeds and feeds.



* Reproduced, together with the accompanying particulars, by courtesy of Mr. W. A. Stanier, Chief Mechanical Engineer, London Midland & Scottish Railway.

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RAILWAY NEWS SECTION

PERSONAL

At the conclusion of the banquet in Paris in connection with the inauguration of the new Dover-Dunkerque train ferry service (see page 619), M. Paul Ramadier—deputising for the Minister of Public Works—invested Sir Herbert A. Walker, K.C.B., General Manager of the Southern Railway, with the insignia of a Commander of the Legion of Honour, and Mr. Charles Cooper, Assistant to the Traffic Manager for Continental Traffic, Southern Railway, with the insignia of a Chevalier of the order.

Sir Josiah Stamp, G.C.B., G.B.E., Chairman and President of the Executive, L.M.S.R., has kindly accepted the Presidency of the Railway Convalescent Homes for the year 1937.

INDIAN RAILWAY STAFF CHANGES

Mr. H. Lingard, Chief Engineer, M. & S.M.R., returned from leave and resumed charge of his duties on September 21.

Mr. P. H. Yeld has been permanently promoted to be Deputy Traffic Manager, Transportation, E.B.R., as from August 13.

Mr. N. D. Calder has been confirmed as Traffic Manager, E.B.R., as from August 13.

Mr. A. M. Sims, Officiating Deputy Agent, N.W.R., has been granted 5½ months' leave as from October 16.

We regret to announce the recent death, at the age of 58, of Colonel Gaston Guex, Manager of the Stansstad-Engelberg Railway, Switzerland, since 1924, and a member of the board of the Association of Swiss Transport Undertakings.

We regret to record the recent death of M. Direz, Chef de l'Exploitation, French State Railways.

From the *London Gazette* of October 13: Commission signed by the Lord Lieutenant of the County of Monmouth: Mr. W. R. Lysaght, C.B.E. (October 12). Mr. Lysaght is Chairman and Managing Director of John Lysaght Limited, and a Director of Guest Keen & Nettlefolds Limited, the British (Guest Keen Baldwins) Iron & Steel Co. Ltd., and other associated undertakings.

Sir Alfred H. Read was—as anticipated in THE RAILWAY GAZETTE of September 25—inducted as President of the Institute of Transport, and delivered his presidential address at the first ordinary meeting of the institute in the 1936-37 session, on Monday last, October 12. Sir Alfred is a foundation

with John Bacon Limited, and later with Samuel Hough Limited, of which combination, under the title of Powell, Bacon & Hough Limited, Sir Alfred became Chairman. On the formation of Coast Lines Limited, he was appointed Managing Director and subsequently Chairman. He has taken a considerable interest in other affairs directly and indirectly connected with shipping, such as the Navy League Sea Training Homes at Liscard, Cheshire, and the Mersey Docks & Harbour Board, of which he was a member from 1904 to 1920. Sir Alfred was Chairman of the Liverpool Steam Ship Owners' Association in 1912, and during the war was Director of Home Trade Services, Ministry of Shipping; his knighthood, received in 1919, was partly in recognition of the services he rendered in this capacity.

G.W.R. APPOINTMENTS

The following appointments have been approved by the Directors of the Great Western Railway:—

Mr. S. G. Hearn, Chief Clerk, Divisional Superintendent's office, Worcester, to be Assistant Divisional Superintendent, Newport.

Mr. C. W. Powell, Travelling Clerk, Superintendent of the Line's office, Paddington, to be Chief Clerk, Divisional Superintendent's office, Worcester.

Mr. W. Morris, Chief Clerk, Divisional Engineer's office, Oswestry, to be Chief Clerk, Divisional Engineer's office, Paddington.

Mr. A. B. Edwards, Clerk, Divisional Engineer's office, Bristol, to be Chief Clerk, Divisional Engineer's office, Oswestry.

The London & North Eastern Railway announces the appointment of Mr. W. W. Capon, Stationmaster, Basford and Bulwell, as Stationmaster, Nottingham Victoria (with charge of Arkwright Street).

Mr. K. A. Wolfe Barry, partner in the firm of Sir J. Wolfe Barry & Partners, Consulting Engineers, Westminster, whose death we recorded in our issue of July 3, left estate valued at £25,337 (£20,505 net).

On October 8, Lord Wemyss, Lord Lieutenant of East Lothian, unveiled a memorial to John Rennie, the famous engineer, near the farm where he was born at East Linton.

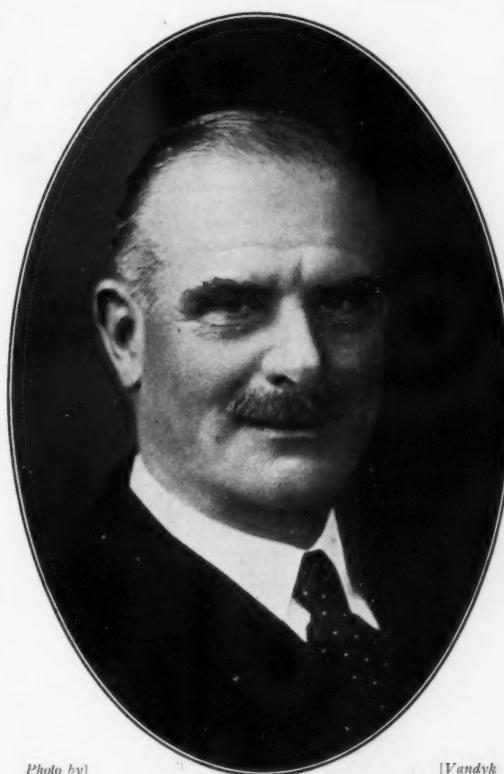


Photo by

[Vandyk]

Sir Alfred H. Read,
Inducted President of the Institute of
Transport, 1936-37

member of the institute and served on the council from 1919 to 1922. He was Vice-President from 1927 to 1930 and his election took place at the annual meeting of the institute last May. He is Chairman and Managing Director of Coast Lines Limited, with which are associated the British & Irish Steam Packet Co. Ltd., Burns & Laird Lines Limited, the City of Cork Steam Packet Co. Ltd., the Belfast Steam Ship Co. Ltd. and other companies. Sir Alfred was born in 1871 and is a son of the late Lt.-Col. Alfred Read of Chester, who was partner in the Powell Line. He received his early business training in the Anchor Line, and was admitted to partnership in his father's business at the age of 22. Under his direction the firm became amalgamated

October 16, 1936

Mr. E. M. Rutter, who, as announced in THE RAILWAY GAZETTE of October 9, has been appointed Passenger Manager, North Eastern Area, L.N.E.R., with headquarters at York, entered the

*Photo by**[Vandyk]***Mr. E. M. Rutter,**Appointed Passenger Manager,
North Eastern Area, L.N.E.R.

service of the old North Eastern Railway in 1907, and prior to the war held positions in the Chief Goods Manager's office at York, and also at West Hartlepool. He obtained a Commission in the Army in September, 1914, and, at the termination of the war, held the position of Assistant Quartermaster-

General in Italy, with the rank of Lieutenant-Colonel. Shortly after demobilisation he was appointed Yardmaster, Blaydon, and in March, 1920, became Dock Superintendent at Middlesbrough and subsequently Assistant District Superintendent, Middlesbrough, in 1923. In 1927 he succeeded to the position of District Superintendent, Middlesbrough, and in 1928 was appointed District Goods Manager, Middlesbrough. It was in August, 1932, that Mr. Rutter was appointed Portmaster at Grimsby, the post he now vacates to go to York as Passenger Manager of the North Eastern Area.

Mr. H. J. Birkbeck, who, as announced in our issue of October 9, has been appointed District Goods and Passenger Manager, Peterborough, L.N.E.R., commenced his railway service with the former North Eastern Railway in the District Passenger Agent's office, Darlington, in 1906. He subsequently served in the Mineral and Goods Departments at Darlington, Middlesbrough and York, and, in 1913, had charge of the North Eastern and East Coast Railways' stands at the Ghent Exhibition. In 1914 his services were loaned to the Tees Development Association, but he was called up for military service on the outbreak of the war. Mr. Birkbeck was demobilised in 1919 with the rank of Lieutenant, R.T.O., and then for two years he was stationed in London in connection with the investigations of the Rates Advisory Committee. After

a period of training in the Operating Department at Hull he was transferred to the office of the Chief General Manager, and for the last seven years he has been in the Goods Manager's

**Mr. H. J. Birkbeck,**Appointed District Goods and Passenger Manager,
Peterborough, L.N.E.R.

rates and charges section. Mr. Birkbeck has taken an active part in the new system of charges authorised by the Road and Rail Traffic Act, 1933, and in questions in connection with the L.M.S.R.—L.N.E.R. and L.M.S.R.—L.N.E.R.—G.W.R. Pools, as member of No. 1 pooling sub-committee.



View recently taken in the yard of Scotswood works, Newcastle-upon-Tyne, showing six 4-6-0 locomotives built by Sir W. G. Armstrong Whitworth & Co. (Engineers) Ltd. for the L.M.S.R. These form part of the order for 227 mixed traffic units

Coastal Shipping in Relation to Transport Planning

Sir Alfred Read's presidential address to the Institute of Transport

On Monday last Sir Alfred Read delivered his presidential address to the Institute of Transport in London. He took as his subject "Coastal Shipping in Relation to Transport Planning, with Some Observations on the Trends of Transport."

Sir Alfred Read said he supposed that everyone who occupied the presidency of the institute felt it his duty to divorce himself temporarily from the special pre-occupation in which he was normally absorbed, and to view the traffic problem as a whole. Those who were charged with the task of seeking a solution to this amazing phenomenon of modern life were faced with a heavy responsibility. The bigger the problem grew, however, the greater became the need for an intelligent, comprehensive, and drastic solution. Sooner or later we should have to find a way to utilise every form of transport to its best advantage, to allocate to each its legitimate function, to cry a halt with the voice of authority whenever any section sought unmerited expansion or impinged on the function of another section; in short, to pool, amalgamate and direct the whole of our resources to the better service of mankind, to the reduction of the costs of industry, and to the just reward of capital investment.

Relation with Inland Transport

It was doubtful whether, until recent years, coastal shipping had been generally recognised as a vital arm of our internal transport system. As the progenitor of all our commercial greatness, it had grown upon the outer edge of internal transport, finding and claiming closer affinity with ocean shipping than with the instruments of distribution by land. Thus coastal shipping came within the aegis of the Board of Trade, while for the control and development of other forms of internal transport the Ministry of Transport was the responsible Government department. As, however, in almost all recent legislation affecting internal transport, coastal shipping impinged on the various problems presented for solution, the question arose as to how long this divergence could continue.

Today there numbered between 300 and 350 regular coastal cargo services, upon which some 300 coastal liners were employed. In addition, there were also more than 900 coastal tramps, and a number of pleasure steamers, some railway-owned, plied during the season between various holiday resorts. Altogether the coastal fleet numbered something like 1,300 vessels, excluding sailers which were more numerous than was generally supposed. The functions of this coastwise shipping was, from Sir Alfred's own experience, "To exploit to the fullest degree the natural advantages of communication conferred upon a community by its seaboard and

its accesses thereto, for the purposes of trade and commerce, defence, and conveyance of passengers and mails."

In its commercial aspects coastal shipping provided the cheapest means, in the case of coalfields nearest the seaboard, of carrying fuel required by industrial undertakings and public services like gas and electricity. Also it was, broadly speaking, the cheapest connecting link between ports; it was peculiarly adapted to the carriage of certain manufactured goods, foodstuffs, raw materials, and bulky or heavy cargoes, and agricultural materials and fertilisers; and to many isolated communities it was the only means of bringing the necessities of life and of marketing the commodities they offered in exchange.

Retarding Influences

Sir Alfred then suggested that among the influences which had tended to retard the progress of coastal shipping was the government assistance afforded other branches of the transport industry in recent years. He quoted, as instances, the government guaranteed loan of £30,000,000 for railway development during the next five years, the government's £100,000,000 road improvement plans, and the subsidisation of commercial aviation. The solatium, on the other hand, offered to coastwise shipping by a temporary subsidy of coastal rates through the Port Traffic Advisory Committee after traffic had been diverted to rail transport by compulsory low rates during the war, was inadequate to enable coastal shipping to rehabilitate itself after wartime losses. For long after 1919 the fortunes of the coaster remained at a low ebb, but recently there had been some evidence of the Government recognising the special problems of coastwise traffic and its importance to the nation.

For instance, coastal shipping had been exempted from the new duties on fuel oil, and a clause was included in the Road and Rail Traffic Bill, introduced in 1933, which was intended to prevent the diversion of traffic from sea routes to the railways consequent upon the railways carrying goods at "agreed charges." Nevertheless the working of this particular clause had given rise to some concern among those coastal shipping companies which operated over long distances. Meanwhile it was to be trusted that the railways would continue to contrive that "agreed charges" should not operate to the detriment of coastal shipping.

When it was considered that in 1885 the coastal trade of Great Britain and Ireland was 51 million net tons and in 1935 the coastal of Great Britain and Northern Ireland was only 54 million net tons, there was some justification for the contention that the seaways had not had their full share of the traffic development of the past century.

A substantial increase in coastwise shipping ought to be recognised as an essential feature of any national transport plan. The realisation of such an increase could be assisted by the limitation of foreign competition from vessels combining short-sea trade with coastal trading, and sailing in British waters with under-manned and underpaid crews. British coastal shipping was also handicapped by the fact that it had to purchase coal at inland rates while coal for foreign shipping was treated as coal for export. Sir Alfred, therefore, suggested the establishment of a licensing system, the prohibition of the use of foreign ships for the coastwise movement of goods and materials produced or required by subsidised or state-aided industries, the readjustment of the Central (Coal Mines) Scheme, the adoption of some modified system of minimum freights, financial assistance to enable British coastal owners to overtake the lead established by foreign countries in the building of ships specially adapted for competing in the British coastal trade, and the adoption of regulations to ensure reasonable operating equality between British and foreign ships.

The application of the internal combustion engine to coastal shipping had made possible the building of vessels of shallow draft. These were able to penetrate to a number of inland ports, such as Norwich, which had as a consequence experienced a revival of former importance. The problem that arose from this was whether it was preferable to have a few large and well-equipped ports, capable of accommodating good-sized vessels at any state of the tide, or to have a multitude of lesser ports, bringing cargoes nearer to their final destination and involving among other things highly expensive upkeep. This was a matter for co-operation between the Government, the ports, shipowners, and shipbuilders.

Present Problems

Sir Alfred concluded his address by surveying the development and co-ordination achieved in various other forms of transport. This led him to ask whether we were heading in the expansion of traffic. Were we really ahead of or behind the transport needs of mankind? Was the amazing increase in traffic merely a response to man's urge for increased mobility, range of movement, and wider life; or was traffic competition forcing the pace upon an unwilling mankind? Was the dog wagging the tail or the tail the dog? Transport was momentarily out of control. Partial restoration of equilibrium was possible in directional planning, but still more urgent was the need for prevention of overlapping, the elimination of duplicated services, the assigning of each transport branch to its proper sphere, and the cutting out of waste in effort and material which were the result of our present un-ordered system, the removal of which would be of incalculable value to the economic life of the nation.

October 16, 1936

Fuel and Transport

At the opening meeting of the winter session of the Institute of Fuel, held in London yesterday (Thursday) afternoon, Sir Philip Dawson, M.P., delivered his presidential address, entitled "Road, Rail and Fuel." Sir Philip began by showing that it was not until the early part of the 19th century that fuel was generally used as a source of motive power in transport. Then it was that the application of steam to rail traction brought about the rapid decline of horse-drawn road transport. Matters remained thus until the close of the century, when, with the coming of the internal combustion engine, long distance road transport once more became a practical proposition. The position in present times was that, while coal was still the dominant factor in rail transport, oil practically controlled road transport and was likely to become increasingly important in railway operation. Electricity also played its part, but in this country, where little water power was available, coal was likely to continue to be of importance, as the application of electricity to traction only meant the consumption of fuel was transferred from the travelling vehicle to the power house.

After drawing attention to the fact that our coal deposits, which were one of our greatest sources of wealth, were not being employed to their best advantage, Sir Philip Dawson outlined the progress made in recent years in the replacement of horse by mechanical transport on the roads. In 1934 there were in this country only 23,000 horse-drawn vehicles as compared with 269,000 in 1921. The number of vehicles propelled by internal combustion engines, on the other hand, had now swelled to nearly 2,500,000, and there were 5,000 others operated by storage batteries or steam. So far there were comparatively few heavy-oil engined vehicles, but with improved engines the numbers were likely to increase. The tax of 8d. per gallon on diesel oil, moreover, had tended to limit the use of these vehicles to long-distance operation.

Sir Philip then continued to show how road transport was rapidly increasing to the cost of the railways. This, he considered, was largely due to the increased facilities offered by road operators. In 1931 there were only 360,314 goods vehicles on the roads, whereas last year there were 435,000. Moreover, in 1935 of the 11,379,500,000 passenger journeys made in this country, 87 per cent. were made on the roads, although, of course, the average fare was only 2·03d. as compared with the average of 8·47d. paid by railway passengers. The growing importance of the road industry was shown also by the fact that in 1935 it employed 1,272,000 persons as against the 675,000 employed by the railways. Between 1921 and 1931 the number of persons engaged in road transport had risen by

28 per cent., whereas there was a decrease of 14 per cent. in the total number in the railway industry.

This rise of the road transport industry had resulted in the consumption of motor spirit in this country rising from 350,000 tons in 1913 to over 4,000,000 tons in 1934. As by far the greater proportion of this fuel was imported, this meant not only that home-produced coal was being displaced, but also that in the event of war the country might be seriously embarrassed. The I.C.I. was doing something in the direction of producing oil from coal, but in Germany they were far more alive to the situation, and it was estimated that of the 2,100,000 tons of synthetic light motor fuel likely to be consumed by Germany in 1936, 1,235,000 tons would be home-produced. Germany had also introduced legislation designed to encourage the use of home-produced fuels, including gas. Similar legislation might, with advantage, be introduced in this country.

Turning to the application of diesel traction to railways, Sir Philip Dawson said that the diesel train had all the advantages of an electric train from the operating point of view. In Germany, where the diesel unit was being much used under a variety of conditions, two-car trains, weighing 74½ tons, seating 102 passengers, and having a top speed of 100 m.p.h., had a maximum thermal efficiency of 28 per cent. as compared with that of 10 per cent. of a steam locomotive. Diesel-electric trains were also proving popular in the U.S.A., where economies were being effected in operating costs, and high speeds were being attained.

As regards the electrification of railways, Sir Philip Dawson said that conversions of both main and suburban lines were constantly taking place throughout the world. The most complete example of main-line electrification was that of the Pennsylvania Railroad, on whose line between New York and Washington (364 route miles) 686 trains were operated daily. Average speeds of 76·6 were attained. In Great Britain most progress had been shown by the Southern Railway. The L.N.E.R., on the other hand, was losing a splendid opportunity of exploiting the Southend line more fully by failing to electrify. An important effect of main-line electrification, which ought not to be forgotten, was that it resulted in a reduction in the demand for coal. The Paris-Orleans Railway for instance, had stated that 1 lb. of coal consumed in a generating station was equivalent to rather more than 4 lb. of the more expensive coal consumed by a steam locomotive.

Finally Sir Philip Dawson discussed the transport of fuel by rail, the quantity of which had been falling steadily in recent years. In 1934, the gross receipts for the transport of fuel represented 38 per cent. of the total receipts

for goods traffic and 20 per cent. of the total gross receipts of the British railways from all sources. The cost of fuel consumed by the railways represented in 1934 one-third of the total locomotive costs; including fuel, this represented 25 per cent. of the total operating costs. There was scope for reducing this percentage and increasing the net and gross receipts by using larger wagons, by reducing empty running, reducing the time wagons stood loaded in sidings, increasing the mileage of locomotives and of train personnel without increasing their hours of service, increasing the percentage of time that locomotives were performing useful work, and decreasing the cost of maintenance of haulage units by adopting new methods of haulage.

Oxy-Acetylene Welding

The British Standards Institution has recently published a specification, B.S. No. 693-1936, for oxy-acetylene welding as applied to steel structures, which is on similar lines to the B.S. specification for electric arc welding published about two years ago, and comprehensively covers in 28 pages the various aspects of the process. It deals in separate sections with preparation and welding procedure, permissible working stresses, workmanship, flame conditions, mechanical tests, filler metal and methods of preparing and carrying out mechanical tests. A number of sketches and diagrams illustrate important points in the text. Rules are laid down for guidance in preparing material in accordance with the thickness of parent metal and direction of welding, for butt and fillet welding; and permissible working stresses, in tension and compression, for butt welds, end and side fillet welds are given.

The section dealing with workmanship describes methods based on the results of sound practice which could well be adopted by any manufacturer as a basis for workshop practice. Distortion, undercutting and peening are referred to and an appendix to this section, with illustrations, indicates the methods which should be used in laying down multi-runs of weld metal. It is interesting to observe that no great reliance has yet been placed on hand cutting by oxy-acetylene of material to be welded, and the specification suggests that hand cutting should only be substituted for machine cutting with the approval of the engineer.

An appendix dealing with filler metal for hand operation tentatively specifies the mechanical properties of all weld-metal specimens and the number of tests to be carried out for quantities of each type of filler rod. It is stated, however, that a complete specification for filler metal will be issued later. Copies of the specification can be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

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Railway Staff and Labour Matters

An important development has to be recorded this week concerning a wages claim made on behalf of footplate staff of the main-line railways. In our issue of June 26, reference was made to a "programme" adopted in May by the annual assembly of delegates of the Associated Society of Locomotive Engineers and Firemen. The programme included the following items:—

- (1) Cessation of the existing percentage deduction from earnings.
- (2) Reduction of the standard working day from eight hours to six hours.
- (3) Sunday duty to be paid for at double time rate.
- (4) Night duty, *i.e.*, duty between 10 p.m. and 4 a.m., to be paid for at the rate of time-and-a-half.
- (5) Day overtime to be paid for at the rate of time-and-a-half.
- (6) Twelve days' annual holidays, exclusive of Sundays, with full pay.

At that time the society, along with the National Union of Railwaymen and the Railway Clerks' Association, was party to a joint claim designed to secure the termination of the deduction of two-and-a-half per cent. from earnings, also the modification of the rates of payment for overtime, night duty, and Sunday duty. The matter was in negotiation with the general managers, but the Associated Society of Locomotive Engineers and Firemen decided to press forward its own separate claim, and this involved parting company, on the original issues, from the other two trade unions. These latter thereupon pursued their joint claim through the remaining stages of the agreed machinery of negotiation, and, as a result, the Railway Staff National Tribunal issued its Decision (No. 1), dated July 27. (A full report appeared in our issue of August 7.) The effect of the decision was to fix the deduction from earnings at one-and-a-quarter per cent. and to increase the rates of payment for overtime, leaving unaltered the rates for night duty and Sunday duty.

The provisions of the decision relating to the percentage deduction applied to clerical, supervisory and other salaried staff. All the provisions of the decision applied to all conciliation grades, including, of course, the grades organised by the Associated Society of Locomotive Engineers and Firemen, with effect from the first full pay following August 16.

As the claim raised by the Associated Society of Locomotive Engineers and Firemen dealt with entirely new issues, it had to be introduced at the appropriate stage of the agreed machinery. Discussions were initiated at a joint meeting held between representatives of the society and the Railways Staff Conference on July 23—three days after the termination of the public proceedings before the Railway Staff National Tribunal, and it was obvious that the sweeping character of the new claim would necessitate extensive investigation by the companies. The matter was further discussed at a joint meeting

on Tuesday last, October 13, and at the conclusion of the proceedings the following official announcement was made:—

A meeting was held in London today between the Railways Staff Conference and representatives of the Associated Society of Locomotive Engineers and Firemen in regard to the proposals put forward by the trade union for varying the National Agreements and Decisions with regard to the remuneration and the conditions of service of drivers, motormen, firemen, assistant motormen, and engine cleaners.

The proposals were fully discussed, but no agreement was reached, and the society's representatives intimated their intention of referring their claim to the Railway Staff National Council, which is the next stage of the agreed machinery of negotiation.

According to the latest staff return published by the Ministry of Transport—the number of drivers, motormen, firemen, assistant firemen, and engine cleaners employed by the four main line companies was, in March last, approximately 71,000.

Road Transport Wages

The committee set up by the Ministers of Labour and Transport held a further public sitting at the Ministry of Labour on Monday, October 12, and considered evidence given on behalf of a "representative group of employers."

The views of this group differ from those of the National Joint Conciliation Board, representatives of which gave evidence on September 29. On behalf of the group, it was urged that wages and conditions of employment must vary from district to district and according to the class of work on which the drivers are employed. The employers were strongly of the belief that until the rates for the carriage of goods by road were determined, it was premature to fix wages and conditions of employment. It was stated by Mr. Sewill on behalf of the Associated Road Operators—"that conditions in the motor haulage industry have come to a state of absolute chaos, particularly as, in fixing the various grades of wages, the Conciliation Board has mainly relied on London and Liverpool agreements. It has scaled the same down in dealing with other districts, instead of taking each district on its merits and fixing an appropriate scale for each area. Further chaos has arisen because, even in the London and Liverpool districts, where the rates were fixed after some investigation by the board, only ten to fifteen per cent. of the employers have taken any notice or observed the scales fixed." Mr. Sewill submitted that area representation on the board was not adequate.

James Street Station Lifts, Mersey Railway

During the last few months a large amount of preparatory work has been carried out in connection with the substitution of four high-speed electric lifts for two of the existing hydraulic lifts at James Street station, Mersey Railway. The changeover began on Friday, August 28, when "A" lift, after 50 years' service, made its last ascent. The first electric lift was put into passenger service on October 1, and the next three will be put into service when completed. Operation is on the same principle as the latest London Transport lifts, and passengers will enter at one end and leave at the other. The new lifts are of the gearless type with modified Ward-Leonard control, in which the lift motors are driven by motor generator sets and the speed of the lift motor is controlled by varying the generator field by means of multiple contactor type controller. They have a capacity of 60 passengers and can be operated at speeds of 200, 300 or 400 ft. per min. as desired. There is also a further speed of 10 ft. per min. for use by the maintenance staff during inspection of the guides, ropes, &c., in the shaft. The old hydraulic lifts were reputed to be the largest passenger lifts in the world, and the new ones will be the largest passenger lifts in the country capable of travelling at 400 ft. per min. Their design embodies all the latest control and safety features and materials. Emergency doors are provided at the

side of each lift making it possible to pass from one lift to another in the remote contingency of one of the lifts becoming stuck between landings when the adjoining lift can be used to remove the passengers. The main contracting firm for this work is Wm. Wadsworth & Sons Ltd. of Bolton, and the sub-contractors are the Metropolitan-Vickers Electrical Co. Ltd. of Manchester, Wm. Tomkinson & Sons of Liverpool, and the audible warning device, which is automatically produced from a light-sound film, was made by the British Thomson-Houston Co. Ltd. of Rugby.

ASBESTOS CEMENT SLATES AND SHEETS.—A British Standard Specification (No. 690) for asbestos cement slates and unreinforced flat sheets and corrugated sheets has just been issued. It relates solely to the dimensions and workmanship of the products, but a foreword emphasises that although there are no requirements for composition, nor are there adequate performance tests, these are questions which are still the subject of investigations. Satisfactory progress is being made in this work and it is hoped that appropriate requirements will be available for incorporation in an early revision of the specification, copies of which may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d., post free.

October 16, 1936

NOTES AND NEWS

New L.M.S.R. Halt in Lancashire.—A new L.M.S.R. halt at Robins Lane, between St. Helens Junction and Sutton Oak, was brought into use on October 12.

Northern Counties (L.M.S.R.) Traffics.—Traffic receipts of the Northern Counties Committee (L.M.S.R.) for the first 40 weeks of the current year amount to £308,767, an increase of £6,781 on those for the corresponding period of 1935.

S.R. Goods Depots Strike.—An unofficial strike of more than 1,000 porters and checkers, which originated at the Bricklayers Arms on October 9, and later spread to the Blackfriars and Gravel Lane (Southwark) depots, has caused a dislocation of traffic in South London. No agreement has yet been reached.

L.M.S.R. "Baby Scots" to be known as "Patriot" Class.—The L.M.S.R. is perpetuating the name *Patriot* formerly carried by the L.N.W.R. war memorial Claughton class locomotive (now withdrawn from service), by transferring it to "Baby Scot" No. 5500. These engines will in future be known as the "Patriot" class.

L.M.S.R. and Road Licences.—An appeal by the London Midland & Scottish Railway Company against the granting of licences and backings to the North Western Road Car Co. Ltd. and the Birmingham & Midland Motor Omnibus Co. Ltd. has been withdrawn. The L.M.S.R. is a large shareholder in both road companies. The appeal was to have been heard at the Ministry of Transport on October 12.

Cheaper Railway Fares for Grooms.—The National Horse Association announces that the railway companies have agreed that a groom accompanying a horse and travelling in a horse-box compartment will be conveyed at half the ordinary single fare for a single journey or ordinary single fare for a return journey. The concession will apply on the basis of one man for each horse. In the case of consignments of ponies under 12 hands, two ponies will be reckoned as equivalent to one horse. The new arrangement comes into force on November 1.

The Railway Club.—At the monthly meeting of the Railway Club, held on October 8, at the Royal Scottish Corporation Hall, Fetter Lane, E.C., Mr. H. W. Bardsley, Honorary Librarian, gave a further talk on "Some British Railway Accidents." Illustrating his remarks by a series of excellent plans, Mr. Bardsley described in an interesting manner, ten accidents, ranging from Chelford in 1894 to Blisworth in 1922, and including the Salisbury, Grantham and Shrewsbury derailments of 1905-6. Other accidents on the old L. & N.W.R. described were Ditton, Sudbury and Weedon, and reference was also made to the Cudworth accident of 1905 on the Midland Railway.

The Tonbridge collision of 1909 was referred to as the only accident in which a member of the Railway Club lost his life. Mr. Kenneth Brown presided.

Ransomes & Rapier Capital Increase.—The shareholders in Ransomes & Rapier Limited have agreed to increase the capital to £280,000 by the creation of 20,000 new ordinary 10s. shares. They have also decided to divide the existing £10 ordinary and preference shares into 20 shares of 10s. each.

Lunch to Sir George McLaren Brown.—Sir George McLaren Brown, the retiring European Manager of the Canadian Pacific Railway, is to be entertained at luncheon by the Canadian Chamber of Commerce in Great Britain on November 3. Sir George was one of the charter members of the chamber, and its first President. Sir T. Hewitt Skinner, President of the chamber, will occupy the chair, and the guests will include representatives of the British railways, as well as of banking, insurance, and shipping.

Southern San Paulo Railway.—At a meeting of holders of the 5 per cent. debenture stock of the Southern San Paulo Railway Company held on October 12, a resolution was unanimously passed sanctioning a scheme of arrangement. This provides for a moratorium of such part of the interest as may be necessary during a period to the end of 1937, with power to the stockholders' committee to extend to 1938 and 1939. A month before each interest date in the moratorium period the committee will meet the directors to decide the interest to be paid.

South London Tube Extension Requests.—Lord Ashfield, Chairman of the London Passenger Transport Board, has arranged to receive a deputation from the Camberwell Borough Council, Southwark Borough Council, and the Camberwell, Peckham and Dulwich Chamber of Commerce on the subject of tube railways in South London. The immediate object of the deputation is to urge the construction as soon as possible of the extension (authorised in 1931) of the Bakerloo Railway from the Elephant and Castle to Camberwell Green. This would be two miles in length, with an intermediate station at Walworth.

Reduced Fares to Continent.—Revaluation of Continental currencies has been followed by fare adjustments for journeys abroad from this country, introduced after negotiation between the companies concerned on October 8. The first class return from London to Paris via Dover-Calais is now, at £7 7s. 8d., cheaper by 12s. 4d. than formerly, while the second class fare has been reduced by 13s. 8d. to £5 7s. 11d. On longer journeys, the savings amount to as much as £5 7s. 6d. on a first class

return to Rome. Passengers by the Southern Railway routes to Switzerland, Belgium, and Germany also benefit, and corresponding reductions have been made on the L.N.E.R. routes to the Continent. A first class single to The Hague via Harwich is now £3 10s. 10d., compared with £3 13s. 3d., while the second class ticket is reduced from £2 14s. Id. to £2 11s. 11d.

Argentine National Co-ordination of Transport Bill.—This bill has now been favourably reported upon by the special committee set up to study it, and is tabled for debate in the extraordinary Parliamentary Sessions to be held almost at once. It may therefore become law any time now, action that will vitally affect not only all railways in Argentina but the whole country.

Mersey Railway Sale Rumours.—Last week rumours gained currency in Liverpool that arrangements were pending for the absorption of the Mersey Railway by the L.M.S.R. Doubtless the electrification of the L.M.S.R. Wirral lines, and the association of the two companies in carrying out the preparations for through running via the Mersey Railway into Liverpool, have given colour to such rumours. Merger proposals were denied by the Mersey Railway in a press interview.

Exhibition of Accounting Machines.—From October 21 to 31 an exhibition of punched card accounting machines, arranged by Powers-Samas Accounting Machines Limited, will be held at Powers-Samas House, Holborn Bars, London, E.C.1. The accounting and statistical machinery to be shown is to include equipment designed for many types of businesses, and capable of operations not hitherto provided for by machines of suitable performance and price. Sir Josiah Stamp will inaugurate the exhibition by declaring it open for a private view at 12 noon next Tuesday, October 20.

United Automobile Services Limited.—This railway-associated motorbus company has recently absorbed some of its subsidiaries, notably those working long-distance coach services between Tyneside and London, for which a revised timetable came into force on October 1. The fleet name "Majestic" has ceased to be used, and all journeys are now made by "United" vehicles. Extraordinary general meetings held on September 30 at Darlington resolved on the voluntary winding up of Majestic Saloon Coaches (Newcastle and London) Limited and Phillipsons Motor Coaches Limited.

Baghdad Railway 4 per cent. Loans.—The Deutsche Bank und Disconto Gesellschaft, under the auspices of which the 4 per cent. Baghdad Railway loans (Series 1 and 2) were originally issued in 1903, is, according to *The Financial Times*, making an offer to German holders to sell their shares at a price of 11 per cent., less bourse and bank charges. Agreements for the gradual redemption of these loans were

concluded between Germany and Turkey in July, 1928, and again in 1933, after payments on the part of Turkey had lapsed. In 1933 the Turkish pre-war debts were converted into a new 7½ per cent. loan. At that time the committee watching over the German interests did not consider the offer sufficiently good as a portion of the railway receipts was mortgaged for the services of the loan. Since the committee has not been successful in its negotiations with the Turkish Government to improve the position of bond-holders, the latter are now urged to accept the offer of the bank.

Railway Servants' Orphanage.—The report for the year to April 30, 1936, of the Railway Servants' Orphanage, Derby, states that during that period 40 children were admitted, and at April 30, 225 children were on the books. Highly favourable school reports on the children have been received, and six boys have been awarded free scholarships to secondary schools. The total income of £14,526 as shown in the accounts, is £1,872 less than for the

previous year, but this is owing to the fact that the £2,000 resulting from the Derby Concert Committee's appeal is being invested and as the stock has not yet been handed over, it could not be included in the accounts under review. The increase in ordinary income is due mainly to additional support by railwaymen in subscriptions deducted through the payrolls, and to greater yields from Orphanage investments.

Road Accidents.—The Ministry of Transport return for the week ended October 10 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year:—

	Killed, including deaths resulting from previous accidents	Injured
England ..	111 (109)	3,766 (3,829)
Wales ..	6 (3)	128 (157)
Scotland ..	10 (16)	352 (329)
	127 (128)	4,246 (4,306)

The total fatalities for the previous week were 124, compared with 127 for the corresponding period of last year.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 41st Week			Totals to Date		
	1936	1935	Inc. or Dec.	1936	1935	Inc. or Dec.
L.M.S.R. (6,916½ mls.)	£	£	£	£	£	£
Passenger-train traffic...	480,000	450,000	+ 30,000	20,900,000	20,442,000	+ 458,000
Merchandise, &c.	531,000	487,000	+ 44,000	19,417,000	18,325,000	+ 1,092,000
Coal and coke	246,000	241,000	+ 5,000	9,732,000	9,296,000	+ 436,000
Goods-train traffic	777,000	728,000	+ 49,000	29,149,000	27,621,000	+ 1,528,000
Total receipts ...	1,257,000	1,178,000	+ 79,000	50,049,000	48,063,000	+ 1,986,000
L.N.E.R. (6,332 mls.)						
Passenger-train traffic...	312,000	296,000	+ 16,000	13,571,000	13,306,000	+ 265,000
Merchandise, &c.	344,000	349,000	- 5,000	13,144,000	12,658,000	+ 486,000
Coal and coke	243,000	246,000	- 3,000	9,417,000	8,979,000	+ 438,000
Goods-train traffic	587,000	595,000	- 8,000	22,561,000	21,637,000	+ 924,000
Total receipts ...	899,000	891,000	+ 8,000	36,132,000	34,943,000	+ 1,189,000
G.W.R. (3,746½ mls.)						
Passenger-train traffic...	195,000	179,000	+ 16,000	8,813,000	8,684,000	+ 129,000
Merchandise, &c.	208,000	200,000	+ 8,000	7,757,000	7,431,000	+ 326,000
Coal and coke	101,000	103,000	- 2,000	4,075,000	4,003,000	+ 72,000
Goods-train traffic	309,000	303,000	+ 6,000	11,832,000	11,434,000	+ 398,000
Total receipts ...	504,000	482,000	+ 22,000	20,645,000	20,118,000	+ 527,000
S.R. (2,153 mls.)						
Passenger-train traffic...	286,000	296,000	+ 17,000	12,898,000	12,689,000	+ 209,000
Merchandise, &c.	67,000	64,000	+ 3,000	2,563,500	2,520,500	+ 43,000
Coal and coke	28,000	30,000	- 2,000	1,251,500	1,199,500	+ 52,000
Goods-train traffic	95,000	94,000	+ 1,000	3,815,000	3,720,000	+ 95,000
Total receipts ...	381,000	363,000	+ 18,000	16,713,000	16,409,000	+ 304,000
Liverpool Overhead ... (6½ mls.)	1,183	1,033	+ 150	49,112	48,817	+ 295
Mersey (4½ mls.) ...	4,507	4,267	+ 240	165,716	163,891	+ 1,825
*London Passenger Transport Board ...	564,000	554,400	+ 9,600	8,367,600	8,122,500	+ 245,100
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,992	1,993	- 1	110,411	108,579	+ 1,832
" " goods	505	524	- 19	21,862	20,400	+ 1,462
" " total	2,497	2,517	- 20	132,273	128,979	+ 3,294
*Great Northern pass. (543 mls.)	10,650	9,800	+ 850	452,350	433,450	+ 18,900
" " goods	10,450	11,900	- 1,450	382,750	378,550	+ 4,200
" " total	21,100	21,700	- 600	835,100	812,000	+ 23,100
*Great Southern pass. (2,067 mls.)	34,686	30,243	+ 4,443	1,498,681	1,454,654	+ 44,027
" " goods	50,592	47,671	+ 2,921	1,653,404	1,545,849	+ 107,555
" " total	85,278	77,914	+ 7,364	3,152,085	3,000,503	+ 151,582

* 40th Week.

† 15th week.

British and Irish Railways Stocks and Shares

Stocks	Highest 1935	Lowest 1935	Prices	
			Oct. 14, 1936	Rise/ Fall
G.W.R.				
Cons. Ord.	55½	44½	60	+ 1½
5% Con. Prefee ...	124	108	124	+ 1
5% Red.Pref.(1950) ...	117	106½	110½	—
4% Deb.	118½	108	118	—
4½% Deb.	122	110	120½	+ 1
4½% Deb.	129½	118	127½	—
5% Deb.	140½	130	138½	—
2½% Deb.	82½	68½	76½	+ 1½
5% Rt. Charge ...	137	128	135½	—
5% Cons. Guar.	136½	120½	133½	+ 1½
L.M.S.R.				
Ord.	255½	16	30	—
4% Prefee. (1923) ...	58½	43½	79	—
4% Prefee.	87½	73½	90	+ 1½
5% Red.Pref.(1955) ...	107	97½	108½	+ 1
4% Deb.	110½	99½	110½	+ 1½
5% Red.Deb.(1952) ...	119½	115½	117½	—
4% Guar.	105½	95½	105½	—
L.N.E.R.				
5% Pref. Ord.	157½	81	131½	—
Def. Ord.	79½	45½	63½	+ 1½
4% First Prefee.	74½	48	78	+ 1½
4% Second Prefee.	31½	16½	31½	—
5% Red.Pref.(1955) ...	92½	71	98	+ 1½
4% First Guar.	103½	93	103	—
4% Second Guar.	98½	82½	98½	—
3½% Deb.	86	75	84	—
4% Deb.	109½	98½	108½	+ 1½
5% Red.Deb.(1947) ...	118½	106½	111½	—
4½% Sinking Fund	112½	108	110½	—
Red. Deb.				
SOUTHERN				
Pref. Ord.	87½	69½	98	—
Def. Ord.	251½	16½	261½	+ 1½
5% Prefee.	124	108½	124	+ 1
5% Red.Pref.(1964) ...	117½	109½	117½	+ 1
5% Guar. Prefee.	136½	121½	133	—
5% Red.Guar.Pref. (1957) ...	121½	112½	117½	—
4% Deb.	116½	107	116	—
5½% Deb.	138	130½	137½	—
4% Red. Deb.	115	106½	112½	—
1962-67				
BELFAST & C.D.				
Ord.	9	4	4½	—
4% Deb.	111½	104½	105½	—
4% Guar.	109½	104	105½	—
FORTH BRIDGE				
4% Deb.	111½	104½	105½	—
4% Guar.	109½	104	105½	—
G. NORTHERN (IRELAND)				
Ord.	20	7	13	- 5½
G. SOUTHERN (IRELAND)				
Ord.	57½	44½	54	- 4
Prefee.	50	25½	60½	- 11½
Guar.	88½	51½	89½	- 1½
Deb.	86½	70	95½	+ 12
L.P.T.B.				
4½% "A"	130	119½	126½	—
5% "A"	139½	130	136½	+ 1
4½% "T.F.A."	113½	108	110	—
5% "B"	131½	122½	129	—
5% "C"	109½	91	102*	- 1
MERSEY				
Ord.	231½	91	39	+ 2
4% Perp. Deb.	100½	93½	100	—
3% Perp. Deb.	75½	67	76½	—
3% Perp. Prefee.	62	47½	67½	—

* ex dividend

October 16, 1936

CONTRACTS AND TENDERS

D. Wickham & Co. Ltd. has received an order from the Egyptian State Railways Administration for three nine-seater Ford-engined inspection railcars for the standard gauge.

The Vulcan Foundry Limited has received an order from the Buenos Ayres Great Southern Railway for 20 built-up type locomotive crank axles.

J. Baker & Bessemer Limited has received an order from the Buenos Ayres Western Railway for 202 locomotive, carriage and wagon axles.

The Societa Ansaldi has received an order for some streamlined diesel railcars from an Italian railway, and these are to be fitted with Mylius mechanical transmission.

Ransomes & Rapier Limited has received an order from the Great Indian Peninsula Railway for two 65-ton steam-operated breakdown cranes and match trucks.

The Sunbeam Electric Manufacturing Company has received an order for turbo-generator equipment required for the above breakdown cranes.

The North British Locomotive Co. Ltd. has received an order from the Bombay, Baroda & Central India Railway Administration for 100 locomotive axleboxes to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

The South Indian Railway Administration has placed orders with Banting & Tresilian for 15 flanged copper plates and with the Phosphor Bronze Company for 78 cwt. of phosphor copper, to be supplied to the inspection of Messrs. Robert White & Partners.

The Associated Equipment Co. Ltd. has received an order from the Trent Motor Traction Co. Ltd. for thirty oil-engined Regent type double-decked passenger vehicles and twenty oil-engined Regal type single-decked passenger vehicles.

The Crown Agents for the Colonies have placed the following orders:—

Ingersoll-Rand Co. Ltd., Air compressor.
R. Hyde & Son Ltd., Axleboxes.
Tees Side Bridge & Engineering Works Limited, Brake blocks.
Stanton Ironworks Co. Ltd., Cast iron pipes.
Cochran & Co. (Ammann) Ltd., Cochran boiler.
British Copper Refiners Limited, Copper.
T. Bolton & Sons Ltd., Copper plates.
Birmingham Battery & Metal Co. Ltd., Copper plates.
Whitecross Co. Ltd., Copper wire.
Churchill Machine Tool Co. Ltd., Crankshaft grinder and cylinder grinding machines.
Nicholson & Fieldsend Limited, Helical springs.
Lawler, Ayers & Co. Ltd., Lathes.
T. Firth & J. Brown Limited, Locomotive axles and tyres.
Universal Steel Tube Co. Ltd., Locomotive boiler tubes.
Howell & Co. Ltd., Locomotive steel boiler tubes.
Brown Bayley's Steel Works Ltd., Steel tyres.
J. Baker & Bessemer Limited, Steel tyres.

Central London Line—Eastern Extension Tunnel Contract

John Mowlem & Co. Ltd. has received from London Transport the contract for the tunnel between Mile End and Leyton, a distance of just over three miles on the eastern extension of the Central London Line. The boring of this section is being undertaken first, because the greater part of it will lie in water-bearing strata and consequently will take longer to complete than the other sections of the scheme. Work will begin before the end of October.

Locomotives Required for South Africa

The South African Railways & Harbours Administration is calling for tenders (Tender No. 1013) for the supply and delivery of 6, 10 or more than 10 new steam locomotives fitted with steel fire boxes, Class 23, type 4-8-2, gauge 3 ft. 6 in. Tenders endorsed "Tender No. 1013—Class 23 Locomotives" should be addressed to Secretary to the Tender Board, South African Railway Headquarter Offices, Johannesburg, receivable by December 21.

Steel Bogie Wagons Enquiry

The South African Railways & Harbours Administration is calling for tenders (Tender No. 1062) for the supply and delivery of 25 drop-sided steel bogie wagons, 63 ft. long, type DZ-8, load 100,000 lb., 3 ft. 6 in. gauge. Tender endorsed "Tender No. 1062, 25 Type DZ-8 Wagons" should be addressed to the Secretary to the Tender Board, South African Railways Headquarter Offices, Johannesburg, by whom they will be received by December 14. A copy of the specifications and general conditions of tender may be borrowed from the Department of Overseas Trade (Room 87). Local representation is essential, and the Department of Overseas Trade is prepared to furnish firms desirous of tendering for the supply of material of United Kingdom manufacture, and not represented in South Africa, with the names of United Kingdom merchant houses with local connections who may be willing to handle tenders on their behalf.

Reference was made on page 544 of our issue of October 2 to an order secured by Beyer, Peacock & Co. Ltd. for a Vivian type Beyer-Garratt locomotive. It was there stated that this locomotive was similar to one originally used at the Vivian Copper Works, Swansea, and on the closing of those works, transferred by the I.C.I. to Billington. Imperial Chemical Industries Limited points out that the engine has been transferred to Billingham, not Billington, and the Swansea works have not been closed down nor is there the slightest likelihood of this taking place.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), Simla, invites tenders receivable by November 19 for one wheel lathe,

one vertical spindle surface grinding machine, one single spindle motion link radius and hole grinding machine, one axle journal re-turning cold rolling and wheel boss facing lathe, and one 30-in. roller feed sand papering machine, required for the Eastern Bengal Railway.

Tenders are invited by the Assam-Bengal Railway, receivable by November 2, at 56, Victoria Street, Westminster, S.W.1, for the supply of four IRS YK type superheated 2-6-0 locomotives.

Tenders are invited, receivable by Messrs. Rendel, Palmer & Tritton, Westminster, S.W.1, by November 2, for the supply of rails and fishplates, fishbolts, steel sleepers and keys required by the Bikaner State Railway.

Forthcoming Events

- Oct. 17 (Sat.)—Permanent Way Institution (Manchester-Liverpool), at Temperance Inst., London Street, Southport, 3 p.m. "The Manufacture of Points, Crossings and Railway Components," by Mr. W. Wilson.
Stephenson Locomotive Society (Scottish), at Mathieson's, High Street, Falkirk, 3 p.m. Business Meeting and Dinner.
Oct. 20 (Tues.)—British Timken Limited, at May Fair Hotel, Berkeley Square, London, W.1, 7.30 p.m. Annual Dinner.
Institute of Transport (London), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m., "Road Transport Statistics," by Mr. A. Kirkus.
Permanent Way Institution (Scottish), at Royal Technical College, George Street, Glasgow, 7.30 p.m. "Rail Joints," by Mr. W. White.
Oct. 21 (Wed.)—Institute of Welding (Manchester), at College of Technology, 7.30 p.m. "Internal Stresses in Welding and their Determination," by Dr. L. Reeve.
I.N.E.R. (Cambridge) Lecture and Debating Society, at Railway Social Club, 7 p.m. "Colour Light Signalling," by Mr. H. Sanderson.
Railway Engineers' Oxy-Acetylene Welding Conference, at British Oxygen Co. Ltd., North Circular Road, Cricklewood, London, N.W.2.
Oct. 22 (Thurs.)—Institution of Electrical Engineers, Savoy Place, London, W.C.2, 6 p.m. Presidential Address by Mr. H. Young.
Institution of Mechanical Engineers, at Grosvenor House, Park Lane, London, W.1. Annual Dinner.
Permanent Way Institution (Brighton), at Welfare Room, New England Street, 7 p.m. "Permanent Way Drainage," by Mr. R. Coward.
Oct. 23 (Fri.)—Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 6 p.m. Presidential Address by Sir Nigel Gresley.
Institution of Railway Signal Engineers, at Criterion Restaurant, Piccadilly Circus, London, W.1, 6.30 for 7 p.m. Annual Dinner and Dance.
Oct. 23-24—I.M.S.R. (London) Dramatic Society, at Cripplegate Inst. Theatre, Golden Lane, E.C.1, 8 p.m. "The Last of Mrs. Cheyne."

Forthcoming Meetings

- Oct. 28 (Wed.)—South Indian Railway Co. Ltd. (Ordinary General), 91, Petty France, Westminster, S.W.1, at 12 noon.
Oct. 28 (Wed.)—Buenos Ayres Great Southern Railway Co. Ltd. (Annual General), River Plate House, Finsbury Circus, E.C.2, at 12.15 p.m.

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OFFICIAL NOTICES

Rio Tinto Co. Ltd.

NOTICE IS HEREBY GIVEN that the Share Transfer Books of the Company will be closed from Wednesday, the 21st, to Saturday, the 31st October, both days inclusive, for the preparation of the Half-yearly Dividend on the Preference Shares which will be paid on the 2nd November.

Holders of Share Warrants to Bearer are informed that they will receive payment of the said Half-yearly Dividend on the Preference Shares at the rate of Two Shillings and Sixpence per Share less Income Tax, on and after Monday, the 2nd November, 1936, on presentation of Preference Share Coupon No. 79, either at the Company's Office in London, or at the Société Générale, 29, Boulevard Haussmann, Paris.

Coupons for payment in London must be left four clear days previously for examination, and may be deposited forthwith.

By Order,
R. H. BEECHER,
Secretary.

Offices of the Company :
11, Old Jewry,
London, E.C.2.
13th October, 1936.

NOTICE IS HEREBY GIVEN that the next Ordinary General Meeting of the South Indian Railway Company Limited will be held at the Offices of the Company, 91, Petty France, Westminster, S.W.1, on Wednesday, the 28th October, 1936, at 12 noon, for the purpose of receiving the Directors' Report and Statements of Accounts for the year ended 31st March, 1936, and for the transaction of the ordinary general business of the Company.

The Transfer Books will be closed from Thursday, the 17th, to Thursday, the 31st day of December, 1936, both days inclusive, for the preparation of the half-yearly Warrants.

Transfers will not be received at the Office while the Books remain closed.

The Warrants payable on and after the 1st January, 1937, will be forwarded to the Proprietors on the 31st December, 1936.

By Order,
E. A. S. BELL,
Managing Director.

Company's Offices :
91, Petty France,
Westminster, S.W.1.
7th October, 1936.

Universal Directory of Railway Officials
and Railway Year Book

42nd Annual Edition, 1936-1937
Price 20/- net.

This unique publication gives the names of all the principal railway officers throughout the world, together with essential particulars of the systems with which they are connected. Much general and statistical information about railways is also concisely presented.

THE DIRECTORY PUBLISHING CO. LTD.
33, Tothill Street, London, S.W.1.

OFFICIAL ADVERTISEMENTS

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to : *The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

"Peeps at the Colonial Empire"

A colonial exhibition under the above title was opened at Charing Cross underground station, by the Rt. Hon. the Earl De La Warr, Under-Secretary of State for the Colonies, on October 9, and remains open free to the public during the rest of the month. This is the first time an attempt has been made, necessarily on a small scale at present, to represent the Colonial Empire as a whole, and as distinct from the Dominions, in any such display. Moreover, the opening was the occasion of Earl De La Warr's first public speech as Under-Secretary of State. The exhibition, which owed its inception to our associated paper, *The Crown Colonist*, was organised by a representative committee presided over by Sir Harry Lindsay, K.C.I.E., Director of the Imperial Institute.

The other members of the committee were Sir Algernon Aspinall (West Indies); Colonel Agius (Malta); Major Corbet Ward (East Africa); Miss Fawcett (Cyprus); Capt. S. J. Graham (Department of Overseas Trade); Mr. E. Jago (Malaya); Dr. Pieris (Ceylon); Mr. H. Spooner (Imperial Institute); and Major W. E. Simnett, (Editor of *The Crown Colonist*), who acted as Secretary.

Lord De La Warr, in declaring the exhibition open, conveyed a message from the Secretary of State, Mr. Ormsby-Gore, expressing the hope that the exhibition might be the means of bringing many people to a realisation of the vastness and of the greatness of the British Colonial Empire. The message added congratulations and thanks to those responsible for arranging the

exhibition, and to the London Passenger Transport Board for the facilities generously provided.

The British Colonial Empire, said Lord De La Warr, covered two million square miles and contained a population of 60 million people. For this empire and for the welfare of all its inhabitants, the British people, through Parliament, were responsible. Yet there was still a great deal of ignorance about the colonies. To try and explain briefly what the Colonial Empire was, and how it differed from the Dominions, a leaflet had been prepared accompanied by a reproduction of the large map at the exhibition, which would be available for distribution to those interested. He hoped many people would take the leaflet home and study it, and that their interest would be quickened to visit that great museum of Empire, the Imperial Institute at South Kensington.

RAILWAY AND OTHER REPORTS

Trent Motor Traction Co. Ltd.—An interim dividend of 4 per cent. (less tax), the same as a year ago, will be paid on October 22.

Talbot Railway.—The directors recommend the payment of a dividend of 1 per cent. or 1s. a share, less income tax at 4s. 9d. in the £, for the year to June 30, 1936.

Bengal Dooars Railway.—The directors recommend the payment of a final dividend of 3 per cent. on the ordinary stock, subject to income tax, making a total distribution of 6 per cent. for the year ended March 31, 1936.

Buenos Ayres & Pacific and Argentine Great Western Railways.—Announcement is made of the payment of six months' interest on account of arrears on the 4½ per cent. consolidated debenture stock of the Buenos Ayres & Pacific Railway and the 5 per cent. debenture stock of the Argentine Great

Western Railway. The Pacific payment covers the January-July period of 1932, and the Argentine Great Western payment is in respect of the six months ended September 30, 1932.

Madras & Southern Mahratta Railway.—At the meeting to be held on December 2, the directors will recommend a dividend for the half-year ending December 31, 1936, payable on January 1, of 4 per cent., which will make a total of 8 per cent. for the year (against 9 per cent. last year).

South Indian Railway.—The directors have decided to recommend that a final dividend for the year 1936 of 1½ per cent., less income tax, be paid from surplus profits on January 1, 1937, making with the guaranteed interest of 1½ per cent. payable on the same date, a total payment of 3½ per cent., less income tax, for the half-year ending December 31, 1936, and together with the payment that was made on July 1,

1936 (namely, 2½ per cent.), a total payment of 5½ per cent. for the year.

Central Argentine Railway.—The directors have declared a dividend of 3½ per cent. on the 4½ per cent. preference stock for the year ended June 30, 1936.

Laycock Engineering Co. Ltd.—The first accounts show a profit of £10,103 for the year ended June 30. The directors propose to pay a dividend at the rate of 5 per cent. per annum for the period from the date of allotment (December 31, 1935) to June 30, 1936, which will absorb £3,812 and leave £6,291 to be carried forward (subject to income-tax). Sales were well in advance of previous records in spite of the fact that a large volume of railway work anticipated from colonial orders did not come into the year's turnover. This work, the directors believe, has been merely delayed, and should go to increase the present year's output. The outlook for the current year is promising, and the order book stands at a higher figure than last year.

Railway Share Market

Although the general tendency in most sections of the Stock Exchange was for activity to show some diminution, Home railway stocks were in good demand and in some cases a further upward movement in prices was established.

Great Western ordinary was prominent around 60, the £22,000 increase in the past week's traffics having created a good impression and aroused hopes that 2½ per cent. will be earned on the ordinary stock for the current year. L.M.S.R. ordinary was active around 30, the traffic gain of £79,000 for the past week being in excess of expectations. The preference were in good demand on any reaction and were inclined to attract increased attention on prospects of appreciation in price if the excellent trend in traffics is continued. L.N.E.R. first preference and second preference both held up well on balance, despite disappointment with the small advance of £8,000 disclosed by the past week's traffic figures. Southern deferred

was active and higher at 26 in response to the traffic rise of £18,000 for the past week and the belief that the upward movement in receipts is likely to be accelerated owing to increased tourist traffic. The preferred was steady around 9½ and is expected in many quarters to reach par before the turn of the year. Debentures and guaranteed stocks of the main line railways were firm in sympathy with the strength of British Government stocks. London Transport "C" stock was relatively steady, as it continues to be anticipated the full results will show that profits are being dealt with on a conservative basis. There was rather more activity reported in Mersey ordinary stock, but moderate fluctuations were shown.

Argentine railway stocks remained dull under the influence of last week's preference dividend announcements, but ordinary stocks, although lower on balance, developed a steadier tendency

later, the disposition still being to await the annual meetings for official views as to the more immediate outlook. Central Argentine was better on the satisfactory traffic return and the 4½ per cent. preference was better at 45. B.A. Great Southern ordinary was steadier at 20½ and the preference stocks were firmer, but the 4 per cent. debentures were fractionally lower at 81½ and Cordoba first debentures were lowered to 37. B.A. Pacific 4½ per cent. consolidated debentures and Argentine Great Western 5 per cent. debentures were marked up on the announcement of payment on account of interest arrears.

San Paulo continued its upward movement and was active, but Leopoldina and Nitrate Rails issues reacted moderately. A point of interest was steady demand for International Railways of Central America common stock. American railroad stocks were steady and Canadian Pacific ordinary and preference held nearly all their recent improvement.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1935-36	Week Ending	Traffics for Week			Aggregate Traffics to Date			Shares or Stock	Prices				
			Total this year	Inc. or Dec. compared with 1935	No. of Weeks	Totals		Increase or Decrease		Highest 1935	Lowest 1935	Oct. 14, 1936	Yield %	
						This Year	Last Year							
Antofagasta (Chili) & Bolivia	834	11.10.36	£	£	£	£	£	+	£	Ord. Stk.	23	1415 ¹	2012 Nil	
Argentine North Eastern	753	10.10.36	9,700	+ 2,297	15	556,980	497,280	+ 59,700	A. Deb.	7	4	61 ²	Nil	
Argentine Transandine	—	—	—	—	—	140,127	126,294	+ 13,833	Mt. Deb.	491 ²	30	471 ²	87 ¹ 6	
Bolivar	174	Sept., 1936	5,200	+ 200	39	—	—	—	6 p.c. Deb.	13	5	71 ²	Nil	
Brazil	—	—	—	—	—	—	—	—	Bonds	14	11	161 ²	3	
Buenos Ayres & Pacific	2,806	3.10.36	77,235	+ 3,204	14	1,019,869	1,008,914	+ 10,955	Ord. Stk.	101 ²	478	10	Nil	
Buenos Ayres Central	190	19.9.36	\$15,000	+ \$11,600	12	\$1,568,300	\$1,516,400	+ \$51,900	Mt. Deb.	21	10	22	Nil	
Buenos Ayres Gt. Southern	5,084	3.10.36	112,000	+ 1,925	14	1,500,902	1,670,583	- 169,681	Ord. Stk.	27	131 ²	21	Nil	
Buenos Ayres Western	1,930	10.10.36	41,176	+ 4,572	15	581,760	596,214	- 14,454	"	24	10	17	Nil	
Central Argentine	3,700	10.10.36	156,878	+ 34,440	15	2,043,131	1,782,344	+ 260,787	Ord. Stk.	177 ²	7	16	Nil	
Do.	—	—	—	—	—	—	—	—	Dfd.	9	314	91 ²	Nil	
Cent. Uruguay of M. Video	273	3.10.36	11,935	+ 2,539	14	150,423	119,254	+ 31,069	Ord. Stk.	81 ²	3	5	Nil	
Do. Eastern Extn.	311	3.10.36	1,830	+ 302	14	23,386	18,762	+ 4,624	"	—	—	—	—	
Do. Northern Extn.	185	3.10.36	1,196	+ 6	14	19,662	15,300	+ 4,362	"	—	—	—	—	
Do. Western Extn.	211	3.10.36	1,114	+ 174	14	13,133	10,343	+ 2,790	"	—	—	—	—	
Cordoba Central	1,218	10.10.36	27,060	- 1,200	15	511,020	479,100	+ 31,920	Ord. Inc.	4	1	2	Nil	
Costa Rica	—	—	—	—	—	—	—	—	Stk.	35	30	35	51 ¹ 8	
Dorada	70	Sept., 1936	14,400	+ 2,200	39	126,600	105,500	+ 21,100	1 Mt. Db.	1035 ²	1021 ²	1041 ²	5 ¹ 4	
Entre Rios	810	10.10.36	12,735	+ 2,706	15	185,267	181,392	+ 4,375	Ord. Stk.	15	61 ²	101 ²	Nil	
Great Western of Brazil	1,082	10.10.36	8,100	+ 1,900	41	298,100	299,000	- 900	Ord. Sh.	1 ²	51 ²	54	Nil	
International of Cl. Amer.	794	Aug., 1936	3317,321	+ \$12,980	35	\$3,624,632	\$3,265,016	+ \$389,612	"	—	—	—	—	
Interocéano of Mexico	—	—	—	—	—	—	—	—	Is. Pref.	1 ²	53 ²	1 ²	Nil	
La Guaira & Caracas	223	Sept., 1936	4,350	+ 790	39	41,545	34,985	+ 6,560	S. k.	81 ²	8	51 ²	Nil	
Leopoldina	1,918	3.10.36	25,329	+ 1,081	40	759,017	697,613	+ 61,404	Ord. Stk.	81 ²	71 ²	71 ²	Nil	
Mexican	483	7.10.36	\$279,400	+ \$30,800	14	\$3,589,300	\$3,511,700	+ \$77,600	"	112 ²	14	54	Nil	
Midland of Uruguay	319	Aug., 1936	7,887	+ 2,378	9	15,621	11,011	+ 4,610	Ord. Sh.	112 ²	112 ²	112 ²	Nil	
Nitrate	397	30.9.36	3,755	+ 429	39	93,600	110,154	- 16,554	Ord. Sh.	64/2	42/2	211 ¹ 6	Nil	
Paraguay Central	274	26.9.36	22,387,000	+ £116,900	13	£33,466,000	£29,128,000	+ £4,338,000	Pr. Lt. Stk.	801 ²	60	74	41 ¹ 6	
Peruvian Corporation	1,059	Sept., 1936	85,485	+ 16,210	13	257,046	217,772	+ 39,274	Pref.	105 ²	67 ¹ 6	121 ²	Nil	
Salvador	100	3.10.36	€12,900	+ 3,125	14	148,527	168,565	+ 20,038	Pr. Lt. Db.	65	61	15	Nil	
San Paulo	—	—	—	—	—	—	—	—	Ord. Stk.	80	35	84 ¹ 8	21 ¹ 5	
Tal Tal	164	Sept., 1936	2,605	+ 1,700	13	8,755	9,250	- 495	Ord. Sh.	111 ¹ 6	11 ¹ 8	11 ¹ 8	87 ¹ 5	
United of Havana	1,353	19.10.36	14,527	+ 2,687	15	231,369	248,856	- 17,487	Ord. Stk.	31 ¹ 6	1	21 ²	Nil	
Uruguay Northern	73	Aug., 1936	778	+ 213	9	1,644	1,199	+ 455	Deb. Stk.	41 ²	215 ¹ 6	41 ²	Nil	
Canadian National	23,615	7.10.36	828,600	+ 40,047	40	27,718,262	25,814,589	+ 1,903,673	Perc. Dbs.	78 ²	52 ¹ 2	711 ²	5 ¹ 3	
Canadian Northern	—	—	—	—	—	—	—	—	4 p.c. Gar.	1035 ²	93	1021 ²	37 ¹ 8	
Grand Trunk	—	—	—	—	—	—	—	—	Ord. Stk.	141 ¹ 6	83 ²	14 ¹ 6	Nil	
Canadian Pacific	17,220	7.10.36	637,800	+ 25,400	40	20,626,600	19,071,200	+ 1,555,400	"	—	—	—	—	
Assam Bengal	1,329	20.9.36	33,015	+ 254	24	571,461	550,775	+ 20,686	Ord. Stk.	92 ¹ 8	771 ²	961 ²	37 ¹ 6	
Barsi Light	202	20.9.36	2,085	+ 1,050	24	58,027	68,887	- 10,860	Ord. Sh.	105	771 ²	691 ²	75 ¹ 1	
Bengal & North Western	2,112	20.9.36	53,878	+ 2,817	25	1,259,127	1,164,038	+ 95,089	Ord. Stk.	3011 ²	291	313 ²	51 ¹ 6	
Bengal Dooras & Extension	161	20.9.36	4,449	+ 192	26	64,407	65,929	- 1,522	"	1271 ²	122	1241 ²	55 ¹ 8	
Bengal-Nagpur	3,268	20.9.36	138,150	+ 21,459	24	2,810,835	2,983,339	- 172,504	"	105	1005 ²	1021 ²	37 ¹ 8	
Bombay, Baroda & Cl. India	3,072	30.9.36	214,950	+ 8,700	26	4,048,650	3,811,050	+ 237,600	"	1151 ²	110	1121 ²	55 ¹ 6	
Madras & Southern Mahratta	3,229	2.9.36	129,675	+ 1,455	24	2,613,377	2,558,318	+ 55,059	"	1281 ²	1137 ²	1121 ²	8	
Rohilkund & Kumaon	546	20.9.36	9,923	+ 1,087	25	246,942	220,324	+ 26,618	"	294	262	311 ¹ 2	51 ¹ 8	
South Indian	2,532	20.9.36	107,909	+ 1,686	24	1,913,743	1,925,803	- 12,060	"	1193 ²	1041 ²	1031 ²	55 ¹ 6	
Beira-Umtali	204	July, 1936	67,976	+ 3,936	44	645,318	640,305	+ 5,013	"	—	—	—	—	
Basilo River & Cantabrian	15	Aug., 1936	1,791	+ 628	25	11,993	12,197	- 204	"	—	—	—	—	
Egyptian Delta	620	30.9.36	8,021	+ 659	26	110,473	102,500	+ 8,973	Prf. Sh.	2	15 ²	14 ¹ 2	51 ¹ 6	
Great Southern of Spain	104	29.8.36	568	+ 2,514	35	33,629	62,623	- 28,994	Inc. Deb.	312	2	312	Nil	
Kenya & Uganda	—	—	—	—	—	—	—	—	"	—	—	—	—	
Manila	—	—	—	—	—	—	—	—	B. Deb.	48	36	471 ²	7 ¹ 8	
Mashonaland	913	July, 1936	103,104	+ 8,610	44	1,019,185	1,159,674	- 140,489	I Mg. Db.	1041 ²	100	1023	47 ¹ 8	
Midland of W. Australia	277	Aug., 1936	11,651	+ 393	9	21,865	23,052	- 1,187	Inc. Deb.	984 ²	93	95	45 ¹ 6	
Nigerian	—	—	—	—	—	—	—	—	"	—	—	—	—	
Rhodesia	—	—	—	—	—	—	—	—	"	—	—	—	—	
South African	13,263	19.9.36	615,929	+ 26,256	24	14,759,411	13,526,990	+ 1,232,421	"	—	—	—	—	
Victoria	4,728	June, 1936	703,693	+ 16,855	52	9,689,925	9,421,092	+ 268,833	"	—	—	—	—	
Zafra & Huelva	112	May, 1936	8,821	+ 2,027	22	48,574	55,398	- 6,823	"	—	—	—	—	

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1¹6.

† Receipts are calculated @ Is. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value.

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Electric Railway Traction

Electrification Activity in Europe

SEVERAL important electrification schemes are approaching completion on the Continent, and they form a pointer to the increasing adoption of direct current traction. On the Paris—Le Mans main line of the French State Railways the standard French 1,500 volts d.c. system is being installed over the 131 miles of double track, but this work, great though it is in itself, forms but a part of a huge programme for the modernisation of the western approaches to Paris. Already it has involved extra tracks and extensive realignment between Paris (Montparnasse) and Versailles, and eventually a big new terminus will be built and the present Montparnasse station closed. Fast suburban trains made up of two-car stainless steel trains will run out as far as Rambouillet, and 4,000 h.p. locomotives will operate non-stop express trains at a schedule of approximately 65 m.p.h. to Le Mans. On the Warsaw suburban network, which is being electrified by British firms, 3,000 volts d.c. is the system chosen, because of contemplated main line extensions in two or three directions from the Polish capital. Test runs have been made already on certain sections, and a partial opening at an early date is foreshadowed. The third great high-tension d.c. electrification approaching completion is the long trunk line from Naples to Reggio, work on which began over two years ago. The northern section, from Naples to Salerno, was opened in 1934, and the whole line is due to be opened before the summer of next year. Meanwhile d.c. electrification is being carried on rapidly near the north-east frontier of Italy, and three-phase lines between Rome and Avezzano and near Pistoia are being converted from three-phase to 3,000 volts d.c. The same system is being used in the U.S.S.R. where several important lines are reported to be under conversion, including heavily-trafficked routes in the Ural and Kussbass districts. Less activity is being shown in the extension of the numerous single-phase lines in central Europe, the only work of note being the conversion work now under way between Nuremberg and Halle on the German State Railway.

Suburban Electrification

THE heavy rush hour peaks of suburban service at low fares have often been considered a relatively unremunerative portion of railway business, and until the serious competition from road interests began, it was viewed as something of a nuisance. But if this indeed is so, electrification provides a very considerable amelioration of the railway company's position, for at a slight extra cost it enables a vastly increased service to be run, and that increase brings in greater revenue. Sir Herbert Walker has said that it has been the increase in non-rush hour business that has made all the difference to the Southern Railway in the financial side of their electrification schemes south of the Thames. Nevertheless, it was electrification itself which provided the opening for this increased traffic, for not only was the railway more ready to develop such traffic, in order to get a load for the power stations throughout as much of the 24 hours as possible, but the vastly better travel facilities of the electric trains had swung over the centre of population to the electrified area and produced the number of people who would take advantage of cheap day return tickets issued just after the end of the morning rush.

As with all types of railway electrification, the incidental advantages of suburban conversions are great, particularly the improvement in station working due to the lesser number of movements required and the more rapid acceleration and deceleration of multiple-unit trains. Such characteristics must be of especial value at busy termini or through stations where a heavy steam-hauled main-line traffic is handled in addition to the suburban trains. Moreover, the smoke nuisance is at its worst round a city terminal station, where anything up to a thousand trains a day, with thousands of steam engine and train movements, are dealt with. And there are not infrequent cases of two or three such terminals being located almost alongside each other. Small wonder, then, that doctors claim to be able to recognise a dweller in such districts by the discolouration of the lungs. Quite apart from the inconvenience caused in the neighbourhood, electrification of termini such as these leads to large direct saving in the painting and maintenance costs of bridges, signals, signal boxes, and buildings generally; the rolling stock is kept cleaner at less expense; and a pleasanter atmosphere is gained in more than one respect.

Railway Power Supply

IN the early days of railway electrification the owning company was prone to instal its own generating plant rather than purchase from an outside source. It was felt then that the railway should have full control over the power supply, and as unit costs generally were at a high level (partly owing to the fluctuating nature of railway requirements) there was little incentive to use existing outside plant. Moreover, thirty or more years ago a purchased railway supply usually formed a considerable proportion of the power company's total load, for such companies were small and their networks were not interconnected. Examples of railway-owned power stations of the pre-war era were the Lancashire & Yorkshire stations at Formby and Clifton; the Mersey Railway plant; and Lots Road on the Underground. During the war, Stonebridge Park on the L.N.W.R. and Durnsford Road, Wimbledon, on the L.S.W.R. were completed. A notable exception to the self-supply rule was the old North Eastern Railway, which purchased its current from the North Eastern Electric Supply Company, both for the Tyneside lines from 1904 and for the Shildon-Newport line from 1915. Most electrifications since the war have been supplied with purchased energy, even when a railway-owned power station has been in existence, and there are many railways nowadays which obtain part of their current from their own generating station and the remainder from a supply company. The diversification of the loads supplied by power companies, together with the increased load and better load factor resulting from the much wider industrial electrification, have made the fluctuation in railway load of less importance to the supply authorities, and, together with the higher thermal efficiency of modern plants, enables those bodies to quote a low tariff. On the other hand, it is claimed that by the interconnection of power stations and transmission systems, a more reliable supply can be given to the railways, and unless there is something very unusual—either technically or economically—it would seem that electrifications of the future will obtain all the necessary energy from outside sources.

STANDARD OVERHEAD EQUIPMENT, AUSTRIAN FEDERAL RAILWAYS

By Ministerialrat Ing. ERNST R. KAAN,
Director of Electrification of the Austrian Federal Railways



Fig. 1—Normal overhead suspension on open double-track section

At the present time, 575 route miles or 16 per cent. of the total network of the Austrian Federal Railways is operated electrically. As in the neighbouring countries, Germany and Switzerland, the system used is 15 kV. single-phase $16\frac{2}{3}$ cycles on the overhead contact wire. On sections electrified prior to 1925, there are various types of overhead construction recommended by Austrian electrical firms, and some of these systems, particularly those on lines electrified before the war, must be regarded as obsolete. As judged by present-day standards, they are extravagant in material, in supports (masts and cross-arms) and catenaries, complicated in construction, and therefore costly to instal and maintain.

In order to reduce costs and decrease the number of spares and replacements to be held in store, the Austrian Federal Railways began in 1924, to develop a standard overhead equipment, inexpensive to manufacture, simple and cheap in maintenance, yet capable of meeting all service requirements. Technical collaboration between manufacturers' engineers and the Chief Electrical Engineer's Department resulted in 1925 in the design of a standard overhead system, which has since been used with small improvements in recent years in the electrification of all further sections of the Austrian Federal Railways.

General Features

In the development of the standard overhead equipment special importance was attached to lightness of supports,

and simple but entirely reliable insulation from earth. Light supports necessitated low mechanical tension in conductors and catenaries, and this in turn required comparatively short spans in order to ensure correct position of contact wire, even when exposed to a strong side wind. It was therefore decided to use for the clear open sections of track a catenary suspension system with automatic tensioning of the contact wire and carrier wire, independent longitudinal movement of each being permitted by pivoted supporting arms.

The standard span is 60 m. (197 ft.) on straight track (Fig. 1); on curves it is reduced, taking into account the radius of the curve and the prescribed displacement of the contact wire at the supports and at the centre of span. The standard height of the contact wire above the surface of the rails is 5·75 m. (18 ft. 10½ in.) on open track and, since 1933, also in stations; but in stations equipped before 1933 and at the more important level crossings the height is 6 m. (19 ft. 8 in.). The minimum height of the contact wire under bridges and other structures is, as far as possible, 5·1 m. (16 ft. 8¾ in.), and in tunnels generally 4·95 m. (16 ft. 3 in.). The height of the catenary system, i.e., the distance of the highest point in the catenary from the contact wire, is 1·3 m. (4 ft. 3½ in.) on open track, and a sag of about 1·0 m. (3 ft. 3⅓ in.) is allowed for the catenary on the standard span of 60 m. (197 ft.). On the open track there is used a profile copper contact wire of 100 sq. mm. (0·155 sq. in.) section, carried by a 35 sq.

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mm. (0.054 sq. in.) galvanised steel catenary. The life of the latter having proved unsatisfactory, bronze has been used in recent construction. The strength and conductivity of the contact wire and catenary are in accordance with fixed standards.

Fig. 2 shows the construction of an ordinary support. The lower insulator has on one side a tube-cap for the reception of the strut, and on the other a fork-cap engaging with an intermediate piece pivoted on the insulator bracket so that the strut can turn about a vertical as well as a horizontal axis. The lateral support or steady brace is pivoted to the tube-cap of the insulator. The upper insulator is of the ordinary suspension type, pivoted on the upper bracket by means of a forked intermediate piece. At the top of the mast there is a feeder line with a normal mounting. It should be noted that the porcelain insulators, which have long been made exclusively by an Austrian firm, are now subjected to bending and tension, as well as tension and compression, with perfectly satisfactory results.

Insulators

Besides the distinctive application of the strut insulator (Fig. 3) the design of which is well-adapted to its different purposes, the standard overhead construction is characterised by the use of light I-beam masts, made possible by the low tension in the overhead system (600 kg. or 1,320 lb. each in the catenary and contact wire), the small span, and the relatively small height. Experience with the single insulation against earth has been thoroughly

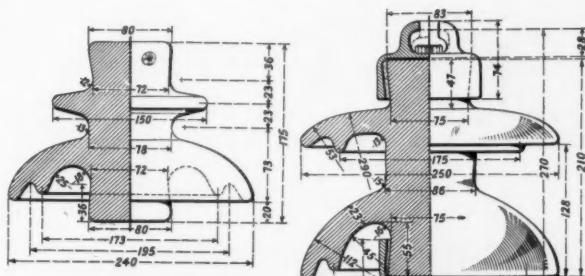


Fig. 3—Normal strut insulator without cap, as used on the Austrian Federal Railways.

Fig. 4—Double-petticoat insulator with suspension fittings

satisfactory, except that in stations where much use is made of steam locomotives some trouble has resulted from the sooting-up and flashover of insulators. This difficulty has been overcome partly by the use of double insulation and partly by the use of double-petticoat insulators (Fig. 4) for single insulation against earth. This type of insulator also is used in tunnels. In some instances, for reasons of economy, old tramway rails have been used instead of new I-beam masts when they have been obtainable on favourable terms. Also, on one line, two different constructions of masts were built up by welding old Vignole rails.

In Fig. 5 are shown tensioning arrangements for the

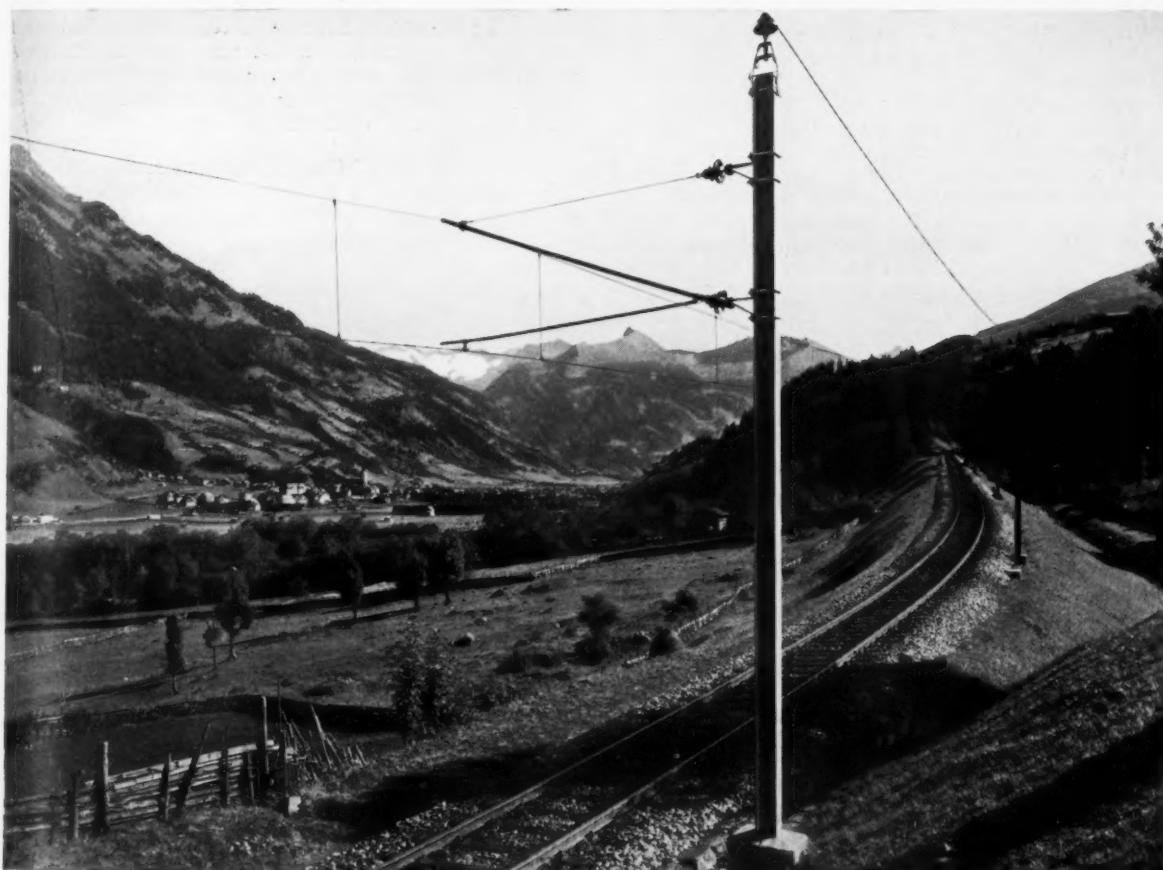


Fig. 2—Standard overhead-construction on single-track section

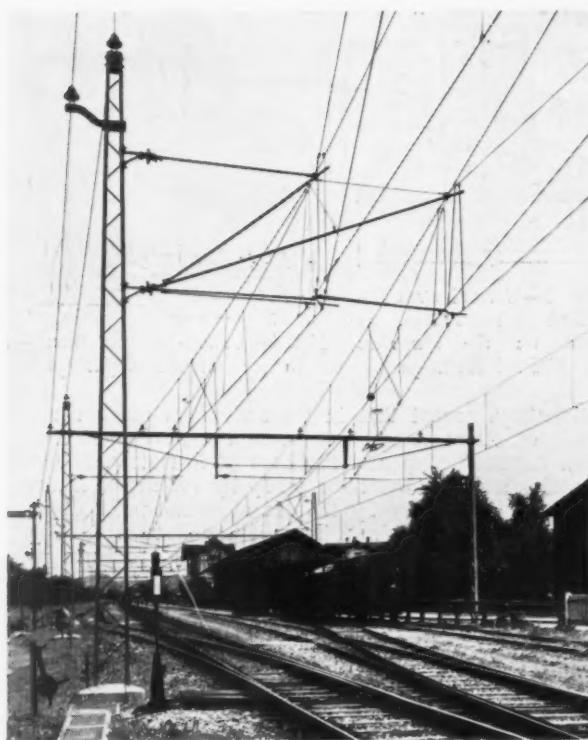


Fig. 6—Suspension of four catenaries and contact wires from a single support

catenary and contact wire on open track; the strength of the insulators used in the standard construction, and the adaptability of the system are illustrated by Fig. 6. Prior to 1933, the catenaries at stations generally were carried by cross ropes or messengers (height of system 2·1 m., or 6 ft. 10½ in.) spanning the whole width of the station (Fig. 7), and a light yoke or gantry construction was used

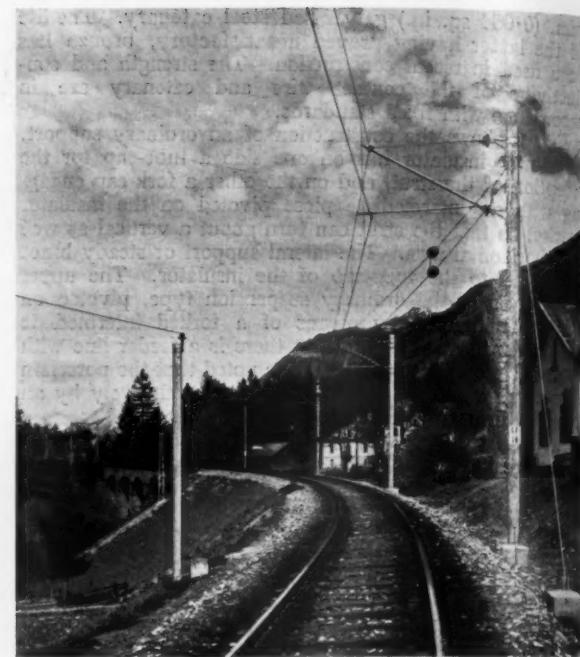


Fig. 5—Tensioning apparatus for standard overhead lines

in small stations and on viaducts. Since 1933, the overhead equipment at stations has generally been made the same as on open track. In single-track tunnels the comparatively simple construction shown in Fig. 8 is employed, and recently a yet simpler construction (Fig. 9) has been adopted in double-track tunnels.

Sectionalising Arrangements

The sectionalising of the contact wire is effected as in Fig. 10, provision being made at each station for disconnection of the adjacent sections. On all lines, the



Fig. 7—Station layout at Kitzbühel, showing use of messengers and double-petticoat insulators



Fig. 8—Overhead construction in single-track tunnel

substations are from 40 to 60 km. (25 to 37 miles) apart and the section supplied by each is normally isolated from the adjoining sections but can be connected to them in emergency. This separation of supply sections has proved satisfactory in expediting the isolation of faults. The disadvantage of the greater voltage drop compared with double-sided feeding can be overcome by the addition of automatic section-coupling switches if load conditions make it necessary. Each station and each length of line between two stations can be switched off separately, and further subdivision is provided only in special cases. The separation of sections between station and open line (Fig. 11) is so disposed in relation to the home signal that a bridging of the sections cannot be effected by the current collector of a locomotive stopped at the signal. Hence, by keeping the home signal at danger, it can be ensured that a switched-off station section cannot be made live by an approaching locomotive. Interlocking between switch and home signals has not yet been provided, no need for it having appeared in service. In single track sections, the auxiliary feeder line can be disconnected from the adjoining sections at each station. In double-track sections the

main purpose of the auxiliary line—bridging lengths of disconnected contact wire for the supply of sections beyond—is taken over by the second contact wire, which is not switched off. For this purpose switch No. 0, Fig. 10, which is normally open, is closed. All the black and open circles in Fig. 10 represent various switches within the station premises.

In each station, the switches are mounted on a frame-



Fig. 9—Simplified overhead construction as used in double-track tunnels

work near the station buildings (Fig. 12); they are very simple in construction (Fig. 13) and their operation is entrusted to the assistant stationmaster. The switch controlling the supply to the contact wire over the loading siding is normally "off," and it is only closed for the running in or out of the electric locomotives. An indicating disc coupled to this switch (Fig. 14) shows at once whether the overhead wire in the siding is alive or not. In Fig. 14 the switch is "off," and the warning disc is in a horizontal position. The switch framework in the stations is built up of light steel channel vertical members and cross bars, with cross braces of bar steel.

The tracks of the locomotive sheds are mostly provided

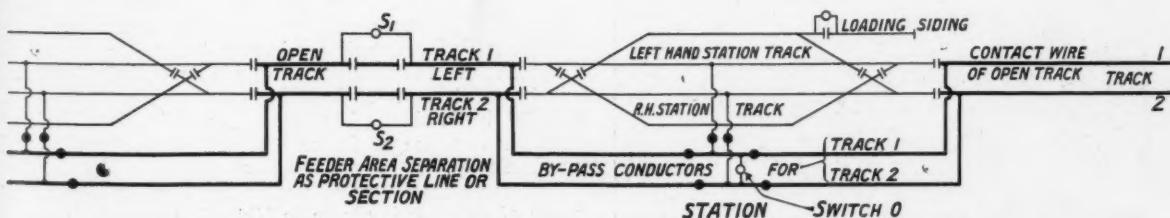


Fig. 10—Circuit arrangements at double-track station, Austrian Federal Railways, showing sectionalising of the contact wire

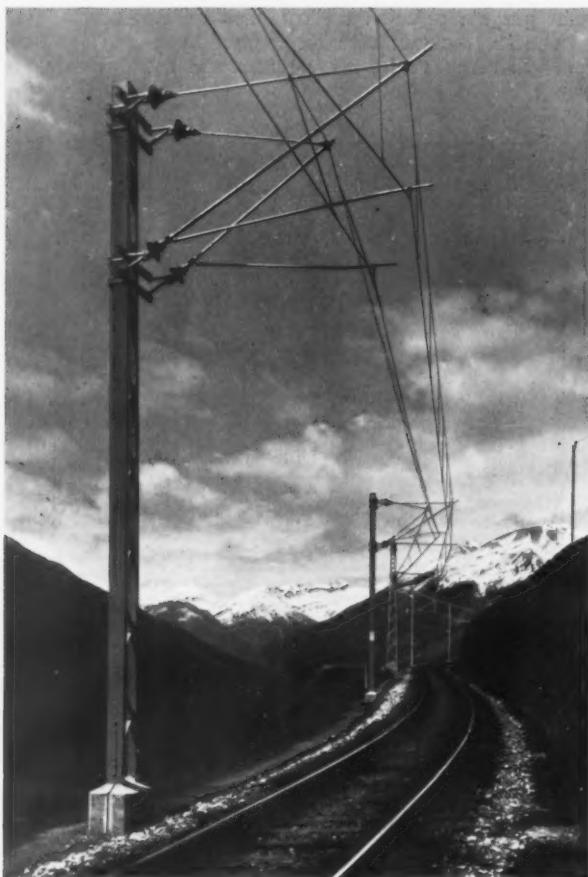


Fig. 11—Separation of station section and open line section as carried out on the Austrian Federal Railways

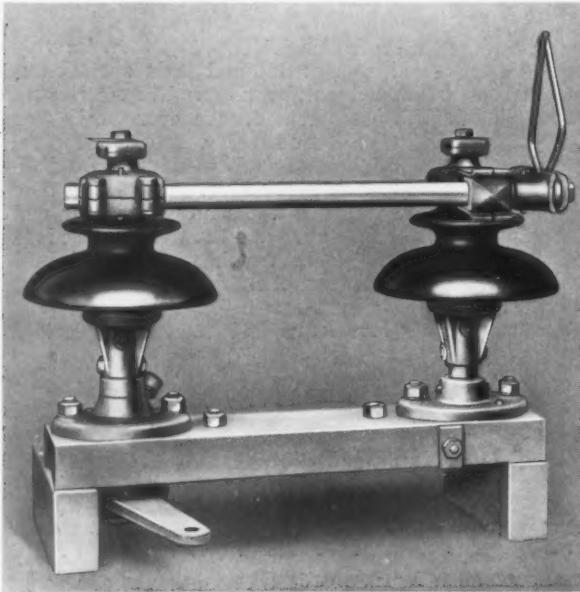


Fig. 13—Switches of simple construction

with overhead contact wires; capstans are used only at workshops. Each shed wire is provided with a separate switch and with an appropriate signalling device showing the position of the switch. An earthing pole is hung on the contact wire of each shed when the switch is open, and warning is given with a hand-bell before switching on. As a further safeguard, every man working on the roof of a locomotive or otherwise in the neighbourhood of the contact wire, is required to padlock the switch "off" and keep the key in his possession while he is at work.

The catenary is generally arranged on the zig-zag system, the mid-point being above the centre line of the track at the middle of the span, and the full width of the zig-zag

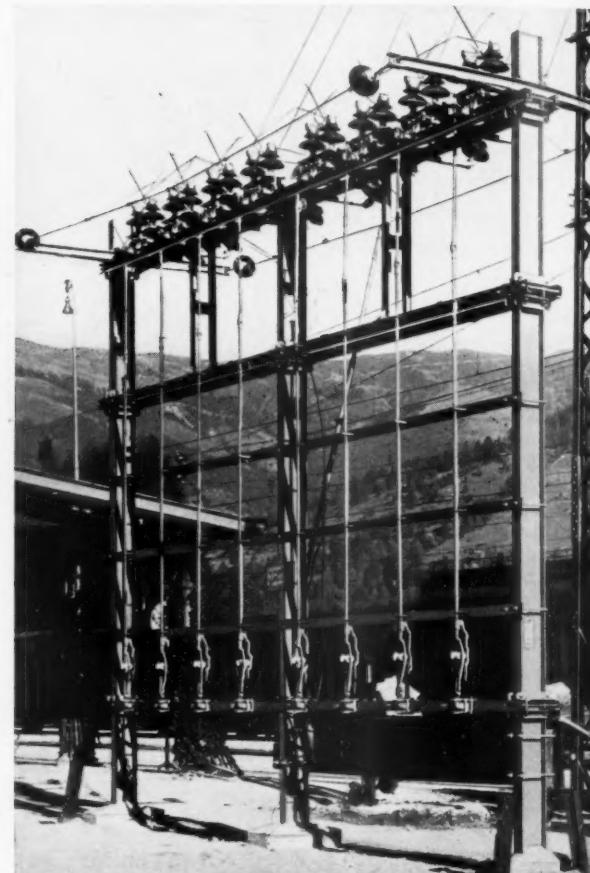


Fig. 12—Arrangement of switchgear at a passenger station

being $2 \times 400 = 800$ mm. (31½ in.). On the latest sections erected, only the contact wire is zig-zagged, the catenary being above the centre line of the track throughout.

The standard insulator already mentioned can be used either as a suspension insulator or as a supporting insulator, the flashover voltages in rain being 57 and 65 kV. respectively. The guaranteed tensile strength is 7,000 kg. (15,430 lb.) and a breaking strength of 9,000 kg. (19,850 lb.) is obtained in acceptance trials. The insulator thus has a large factor of safety electrically and mechanically.

The most usual type of section insulator for the contact wires of turnouts is shown in Fig. 15, from which it will be seen that the construction is remarkably light and simple. No special return circuit is provided, there being

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neither longitudinal bonds between rails nor an earth wire. Cross bonds are used between rails in stations; at level crossings, and at some other places.

As regards the cost of construction and maintenance of the overhead installation, the costs of erection are:—

	Austrian schillings per track-km.	£ per track-mile (at 26 sch.=£1)
	s. d.	s. d.
(1) Open double-track line ..	20.00	24 9
(2) Open single-track line—		
(a) With auxiliary feeder ..	25.50	31 7
(b) Without auxiliary feeder ..	21.40	26 6
(3) Medium-sized station, i.e., one with about 5 km. (3.1 miles) of track ..	30.50	37 9

The maintenance costs on the continuous system between Salzburg and the terminal stations of Buchs, Bregenz, Brennero and Kufstein, with 660 km. (410 miles) electrified (312 km. or 194 miles being double-track), come to 784 Austrian schillings per km. (about £48 10s. per mile) for wages and salaries, and 180 Austrian schillings (£11 3s. per mile) for material, a total of 964 schillings per km. or £59 13s. per mile (at 26 schillings = £1) per annum.

Experience with the standard overhead construction now extends over a period of some years and has been extraordinarily favourable, both as regards reliability in service and as regards maintenance. Also, it is remarkable that this overhead construction, which was originally designed only for speeds of from 90 to 100 km.p.h. (56 to 62 m.p.h.) has proved suitable for speeds of 130 km.p.h. (81 m.p.h.) without any modification. The success achieved with this system in Austria has been such that it has been adopted wholly or in part by foreign railways.

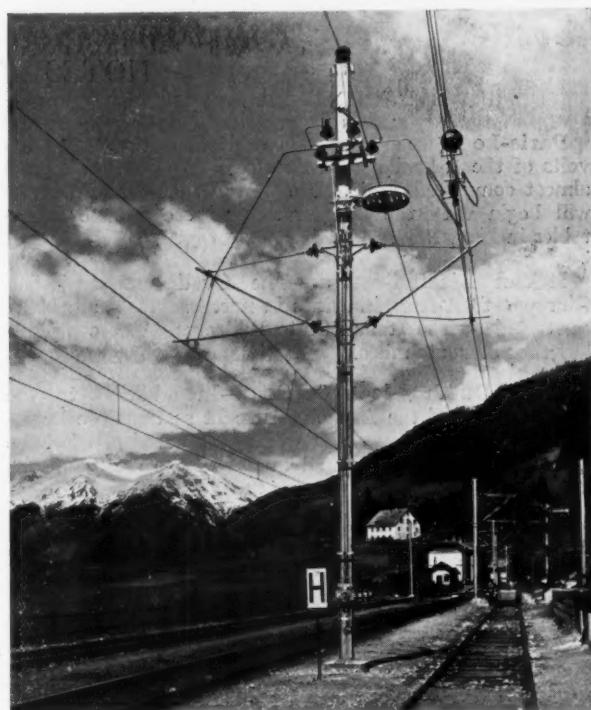


Fig. 14—Siding switch with position indicator "off"



Fig. 15—Section insulators and overhead construction at Spittal-Millstattersee station

NOTES AND NEWS

Paris-Le Mans Line.—The electrification at 1,500 volts of the 131-mile main line from Paris to Le Mans is almost completed, and it is expected that through trains will begin with the inauguration of the summer timetables in May, 1937.

Italian Electrification.—The Ovada-Asti and San Giuseppe to Alessandria lines in northern Italy are being electrified by the Italian State Railways. The combined length is 87 route miles.

More Dutch Electrification.—In addition to the electrification of the Arnheim-Utrecht section, the beginning of conversion work on which was noted in the issue of this Supplement for September 18, the line from the Hague to Gouda and Utrecht is to be electrified.

Switchgear.—An exceedingly well reproduced brochure dealing with internal isolation switchgear on the Whitehead system has reached us from Switchgear & Cowans Limited. It deals at length with the details of the internal isolation mechanism, and is copiously illustrated with half-tone blocks showing the inside and outside of the apparatus, and with a frontispiece depicting the interior of a Liverpool Corporation substation which houses a 28-panel 350,000 kVA internal isolation switchboard. There is a foreword on the selection of switchgear and the performance of circuit breakers, and this shares a feature which extends throughout the descriptive matter, viz., the arrangement of the blocks against the text referring to them, and making for smooth and easy reading.

Electrification in the U.S.S.R.—It is stated that the electrified railway lines in the U.S.S.R. are to be extended this year by an additional 350 miles, bringing the total mileage of electrified lines to 4,200 miles. Apparently these are track miles. Work is proceeding briskly on the Murmansk line, and early next year electric trains will be running to Murmansk. They are running already between Kandalaksha and Kirov, as noted in the description of this line published in our May 29 issue.

The electrification of a section of 140 miles on the Goroblagodatskaia to Chusovskaia line is nearing completion, and when this stretch is opened, through electric trains will be able to run between Kizel and Sverdlovsk, a distance of 350 miles. It is hoped that by the beginning of 1937 some electric trains will be running on the Moscow-Alexandrovsk section of the Yaroslavl railway, a distance of 80 miles. On the Tomsk line, electrification is proceeding between Novokuznetsk and Belovo, a distance of 100 miles, linking up the Kuznetsk coal basin with the industrial centres of the Urals. In addition, the line from Moscow to Tsaritsino on the Dzerzhinsky railway is being converted.

Norwegian Electrification.—The 37-km. (23 miles) section of the State Railways between Kongsberg and Hjuksebø and the 93 km. ($57\frac{3}{4}$ miles) long Bratsberg railway, in which the Norwegian Hydro-Electric Company is interested as well as the State, were opened for electric working on May 15. Previously electric traction was in use only between Oslo, Drammen and Kongsberg, opened from Oslo to Drammen in 1922 and on to Kongsberg in 1929. The extension was planned from the outset, for this section of 99 km. ($61\frac{1}{2}$ miles) was not sufficient to enable the Hakavik power station or the electric locomotive stock to be used to the best advantage. The connecting

line of the Tinnos Railway—worked electrically since 1912—had no through working with the State system, as the type of current used was different. This has now been altered. The Kongsberg to Hjuksebø section is well suited to electric working, having gradients of as much as 1·8 per cent. The highest point on the line is in the Hjerpetjern tunnel, 414 m. (1,358 ft.) above sea level.

No additional electric locomotives have been required. The electrification cost 3,858,000 kr.—1,068,000 kr. for the portion from Kongsberg to Hjuksebø and 2,790,000 kr. for the Bratsberg railway.

Swiss Rack Railway Conversion.—As was anticipated in the *Electric Railway Traction Supplement* for May 29, 1936 (page 1068), the Vitznau-Rigi rack railway is to be electrified in order to reduce working expenses and at the same time provide a faster service. Overhead transmission at 1,500 volts d.c. with overhead contact line has been selected, and current will be obtained from the Schwyz Electric Works at 14,700 volts a.c. and converted in a remote-controlled converter at Romiti. Three motor-coaches, each seating 80 passengers and capable of pushing one of the present cars, will be ordered, and are expected to complete the ascent in 30 to 35 min. and the descent in 35 to 40 min., as against the present time of an hour in each direction. A few of the 11 steam locomotives will be retained to assist in dealing with peak traffic in summer. The total cost of electrification is estimated at 565,000 fr.

The Vitznau-Rigi Railway is a standard-gauge line 6·8 km. in length, on the Riggibach rack system; it is double-tracked from Freibergen to Kaltbad. The maximum gradient is 1 in 4. The line was opened as far as Staffelhöhe in 1871, and to the summit in 1873. The Staffelhöhe-Kulm section is leased from the Arth-Rigi Railway.

Swedish Electrification Figures.—Mr. Granholm, general manager of the Swedish State Railways, recently stated that from 907 km. (562 miles) in 1932 the length of electrified line had been raised in four years to 2,596 km. (1,610 miles), or 35 per cent. of the total mileage of the State system. By the end of 1937 the route length of electrified line would total 3,353 km. (2,080 miles), equivalent to 45 per cent. of the total length of railway. In 1932 the State Railways had to import 400,000 tons of locomotive coal, but by the end of 1937 only 200,000 tons a year would be necessary. Electrification had enabled the time of ordinary through goods trains between Stockholm and Malmö, about 600 km. (372 miles) to be cut from 26 hr. to 15 hr., and the time of passenger trains from 9 hr. 54 min. to 8 hr. 5 min., giving an average speed of 46 m.p.h.

In the summer timetables electric traction is scheduled to effect 10,284 express passenger train miles and 22,432 ordinary passenger train miles a day, in addition to a large goods train mileage. On the Lapland iron ore railway alone (the first State line to be electrified) the electrically-hauled freight traffic amounted to 5,100,000 tons and 472,000,000 ton-miles for the year 1935. Since 1932 about £1,300,000 from the renewal fund has been used in the purchase of electric locomotives, of which there are now 399 in service. Malmö steam locomotive repair shop has been re-equipped to effect the heavy repairs to the standard electric locomotives.